



CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1281

[CPSC Docket No. CPSC–2006-0057]

Safety Standard for Portable Generators

AGENCY: Consumer Product Safety Commission.

ACTION: Supplemental Notice of Proposed Rulemaking; notice of opportunity for oral presentation of comments.

SUMMARY: The U.S. Consumer Product Safety Commission (Commission or CPSC) has preliminarily determined that there is an unreasonable risk of injury and death associated with acute carbon monoxide (CO) poisoning from portable generators. To address this hazard, the Commission proposes a rule under the Consumer Product Safety Act (CPSA) that limits CO emissions from portable generators and requires generators to shut off when specific emissions levels are reached. The Commission is providing an opportunity for interested parties to present comments on this supplemental notice of proposed rulemaking (SNPR).

DATES: *Deadline for Written Comments:* Written comments must be received by **[INSERT DATE THAT IS 60 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**.

Deadline for Request to Present Oral Comments: Any person interested in making an oral presentation must send an electronic mail (e-mail) indicating this intent to the Office of the Secretary at cpsc-os@cpsc.gov by **[INSERT DATE THAT IS 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: *Written Comments:* You may submit written comments in response to the proposed rule, identified by Docket No. CPSC-2006-0057, by any of the following methods:

Electronic Submissions: Submit electronic comments to the Federal eRulemaking Portal at: www.regulations.gov. Follow the instructions for submitting comments. CPSC typically does not accept comments submitted by e-mail, except as described below. CPSC

encourages you to submit electronic comments by using the Federal eRulemaking Portal, as described above.

Mail/hand delivery/courier Written Submissions: Submit comments by mail/hand delivery/courier to: Office of the Secretary, Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD 20814; telephone: (301) 504-7479. If you wish to submit confidential business information, trade secret information, or other sensitive or protected information that you do not want to be available to the public, you may submit such comments by mail, hand delivery, or courier, or you may e-mail them to: cpsc-os@cpsc.gov.

Instructions: All submissions must include the agency name and docket number. CPSC may post all comments without change, including any personal identifiers, contact information, or other personal information provided, to: www.regulations.gov. Do not submit through this website: confidential business information, trade secret information, or other sensitive or protected information that you do not want to be available to the public. If you wish to submit such information, please submit it according to the instructions for mail/hand delivery/courier written submissions.

Docket for SNPR: For access to the docket to read background documents or comments received, go to: www.regulations.gov, insert the docket number CPSC–2006-0057 into the “Search” box, and follow the prompts.

FOR FURTHER INFORMATION CONTACT: Janet Buyer, Directorate for Engineering Sciences, Office of Hazard Identification and Reduction, Consumer Product Safety Commission, National Product Testing and Evaluation Center, 5 Research Place, Rockville, MD 20850; telephone: 301-987-2293; jbuyer@cpsc.gov.

SUPPLEMENTARY INFORMATION:

I. Background¹

¹ On April 5, 2023, the Commission voted (4-0) to publish this supplemental notice of proposed rulemaking. Commissioners Boyle and Feldman issued statements in connection with their votes: <https://www.cpsc.gov/s3fs->

In 2006, the Commission published an advance notice of proposed rulemaking (ANPR) to consider whether there may be an unreasonable risk of injury and death from CO poisoning associated with portable generators.² The ANPR began a rulemaking proceeding under the CPSA.

Following publication of the ANPR, CPSC contracted with the University of Alabama (UA) to conduct a demonstration of prototype low CO emission technology for portable generators. CPSC also contracted with the National Institute for Standards and Technology (NIST) to conduct comparative testing of generators in an attached garage of a test house facility, and to perform indoor air quality (IAQ) modeling. CPSC staff published a report regarding the results of the UA technology demonstration and NIST's test results.³ NIST published a report concerning the results of the comparative testing of generators as well as IAQ modeling they performed using their test results.⁴

In October 2016, staff delivered to the Commission a draft proposed rule to address the CO poisoning hazard associated with portable generators.⁵ The draft proposed rule would have limited the CO emission rates of portable generators based on four different engine size categories. Staff estimated the proposed CO emission rates equated to reductions of approximately 75 percent for the smallest generators to approximately 90 percent for the two largest size categories, compared to the typical CO emission rates of current generators.

public/2023-04-05-COMB-Portable-Generator-SNPR-Statement.pdf?VersionId=ztywIcwqWcpY1eFObXtqXsdHjklGTgKa; and <https://www.cpsc.gov/About-CPSC/Commissioner/Peter-A-Feldman/Statement/Statement-of-Commissioner-Peter-A-Feldman-Requesting-Comment-on-Portable-Generator-Intellectual-Property-and-Licensing-Concerns>.

² Portable Generators; Advance Notice of Proposed Rulemaking; Request for Comments and Information, 71 FR 74472 (Dec. 12, 2006) (Document ID number CPSC-2006-0057-0001 in www.regulations.gov).

³ *Technology Demonstration of a Prototype Low Carbon Monoxide Emission Portable Generator* <https://ecpsc.cpsc.gov/pmo/portgen/Shared%20Documents/staff%20report%20on%20technology%20demonstration.pdf> (Document ID number CPSC-2006-0057-0002 in www.regulations.gov).

⁴ *NIST Technical Note 1781; Modeling and Measuring the Effects of Portable Gasoline Powered Generator Exhaust on Indoor Carbon Monoxide Level* <https://ecpsc.cpsc.gov/pmo/portgen/Shared%20Documents/CPSC%20staff%20cover%20statement%20and%20NIST%20TN%201781.pdf>

⁵ *CPSC Staff Briefing Package for Notice of Proposed Rulemaking For Safety Standard For Carbon Monoxide Hazard For Portable Generators, October 5, 2016*, <https://www.cpsc.gov/s3fs-public/Proposed-Rule-Safety-Standard-for-Portable-Generators-October-5-2016.pdf> (Document ID CPSC-2006-0057-0032 in www.regulations.gov).

The Commission voted to approve publication of the draft proposed rule, and the proposed rule was published on November 21, 2016.⁶ The Commission received written comments and oral presentations from the public. Section IX contains a summary of significant comments received and staff's responses to these comments.

Following publication of the NPR, Underwriters Laboratories (UL) and the Portable Generator Manufacturers Association (PGMA) each published new editions of their voluntary standards that included CO hazard mitigation requirements. UL published ANSI-approved UL 2201, *Standard for Safety for Carbon Monoxide (CO) Emission Rate of Portable Generators, Second Edition*, on January 9, 2018 (UL 2201).⁷ PGMA published ANSI-approved ANSI/PGMA G300-2018, *Safety and Performance of Portable Generators*, on April 20, 2018 (PGMA G300).⁸

In 2019, the Commission announced the availability of and sought comment on NIST Technical Note 2048, "Simulation and Analysis Plan to Evaluate the Impact of CO Mitigation Requirements for Portable Generators."⁹ NIST Technical Note 2048 represents a plan developed by CPSC staff and NIST staff to estimate the effectiveness of the CO mitigation requirements in PGMA G300 and UL 2201. In August 2020, the Commission announced the availability of a memorandum resulting from CPSC and NIST staffs' review of the comments received, including adjustments made to the simulation and analysis plan.^{10,11}

⁶ Notice of proposed rulemaking, *Safety Standard for Portable Generators*, 81 FR 83556 (Nov. 21, 2016) <https://www.federalregister.gov/documents/2016/11/21/2016-26962/safety-standard-for-portable-generators>

⁷ UL 2201, *Standard for Safety for Carbon Monoxide (CO) Emission Rate of Portable Generators, Second Edition*, Dated Jan. 9, 2018.

⁸ ANSI/PGMA G300-2018 (Errata Update), *Safety and Performance of Portable Generators*, available online at [https://www.pgmaonline.com/pdf/ANSI_PGMA G300-2018\(ErrataUpdateApril2020\).pdf](https://www.pgmaonline.com/pdf/ANSI_PGMA G300-2018(ErrataUpdateApril2020).pdf). On May 1, 2020, PGMA issued an erratum update to PGMA G300-2018 that changed the requirement for packaging marking from a logo to the following text or equivalent wording: "This product complies with the ANSI/PGMA G300-2018 standard." References to "PGMA G300" in this document refer to ANSI/PGMA G300-2018 (Errata Update).

⁹ Notice of Availability: Plan to Evaluate CO Mitigation Requirements for Portable Generators, 84 FR 32729 (July 9, 2019), <https://doi.org/10.6028/NIST.TN.2048>.

¹⁰ Notice of Availability: Revisions to the Plan Documented in NIST Technical Note 2048: Simulation and Analysis Plan to Evaluate the Impact of CO Mitigation Requirements for Portable Generators, 85 FR 52096 (Aug. 24, 2020).

¹¹ Staff memorandum, <https://www.cpsc.gov/s3fs-public/revisions-to-TN2048-and-comment-resolutions.pdf> (Document ID CPSC-2006-0057-0106 in www.regulations.gov).

In February 2022, CPSC staff reported to the Commission its findings regarding the effectiveness of the CO mitigation requirements in PGMA G300 and UL 2201, “*CPSC Staff Briefing Package on Assessment of Portable Generator Voluntary Standards’ Effectiveness in Addressing CO Hazard, and Information on Availability of Compliant Portable Generators.*”¹²

The Commission is issuing this supplemental notice of proposed rulemaking because the revised proposed rule, based on requirements from UL 2201 and PGMA G300 that did not exist at the time of the NPR, is likely to reduce the risk of CO injuries and deaths to a greater degree than those in the 2016 NPR. Additionally, the combination of requirements in this SNPR builds on industry’s own standards, which should facilitate compliance. In particular, this SNPR adds requirements related to shutoff when high CO levels are detected, which have begun to achieve industry acceptance. The SNPR also adopts emissions requirements consistent with the UL 2201 standard, because both actual fatal incidents and scenario simulations show that an effective shutoff system alone is not sufficient to protect consumers from death and serious injury from accumulated CO.

The CO emission rates of portable generators are on the order of hundreds of times the CO emission rates of gasoline powered automobiles. From 2004 through 2021, there were at least 1,332 CO-related consumer deaths involving portable generators, or an average of about 74 lives lost annually, with thousands of non-fatal poisonings of consumers per year. Fatalities have increased in recent years. For example, for the three most recent years for which complete data are available (2017 through 2019), generator-related CO deaths have averaged 85 per year.

The Commission expects that the proposed rule would be highly effective in avoiding generator-related CO incidents, producing benefits that far exceed the estimated costs. Over 30 years, the Commission estimates the rule would prevent 2,148 deaths (nearly 72 deaths per year)

¹² https://www.cpsc.gov/s3fs-public/Briefing-Package-on-Portable-Generator-Voluntary-Standards.pdf?VersionId=hLnAkKQ6bCD_SKin8RE6Iax.BjZsB5x3 (Document ID CPSC-2006-0057-0107 in www.regulations.gov).

and 126,377 injuries (roughly 4,213 injuries per year). The total benefits from the rule are estimated to be greater than \$1 billion per year during this period, using a discount rate of 3 percent. This represents approximately \$273 of benefits for each generator sold. Costs are far lower, such that the Commission estimates net benefits, with a discount rate of 3 percent, to be approximately \$897 million per year. For every \$1 in estimated direct cost to consumers and manufacturers, the proposed rule generates more than \$7 in benefits from mitigated deaths and injuries.

The information discussed in this preamble is derived from CPSC staff's briefing package for the SNPR, "Staff's SNPR Briefing Package," which is available on CPSC's website at: www.cpsc.gov/s3fs-public/SupplementalNoticeofProposedRulemakingSNPRSafetyStandardforPortableGenerators.pdf?VersionId=zxwp.NpJj8nNCxLf7Clp3zMVqLB1MrGE. For a more comprehensive and detailed discussion of the information in this preamble, see the Staff's SNPR Briefing Package.

II. Statutory Authority

This supplemental notice of proposed rulemaking is authorized by the CPSA. 15 U.S.C. 2051-2084. Section 7(a) of the CPSA authorizes the Commission to promulgate a mandatory consumer product safety standard that sets forth performance or labeling requirements for a consumer product if such requirements are reasonably necessary to prevent or reduce an unreasonable risk of injury. 15 U.S.C. 2056(a). Section 9 of the CPSA specifies the procedure that the Commission must follow to issue a consumer product safety standard under section 7 of the CPSA. The Commission commenced this rulemaking by issuing an ANPR.

According to section 9(f)(1) of the CPSA, before promulgating a consumer product safety rule, the Commission must consider, and make appropriate findings to be included in the rule, on the following issues:

- The degree and nature of the risk of injury that the rule is designed to eliminate or reduce;
- The approximate number of consumer products subject to the rule;

- The need of the public for the products subject to the rule and the probable effect the rule will have on utility, cost, or availability of such products; and
- The means to achieve the objective of the rule while minimizing adverse effects on competition, manufacturing, and commercial practices.

15 U.S.C. 2058(f)(1).

Under section 9(f)(3) of the CPSA, to issue a final rule, the Commission must find that the rule is “reasonably necessary to eliminate or reduce an unreasonable risk of injury associated with such product” and that issuing the rule is in the public interest. *Id.* 2058(f)(3)(A) & (B). Additionally, if a voluntary standard addressing the risk of injury has been adopted and implemented, the Commission must find that:

- The voluntary standard is not likely to eliminate or adequately reduce the risk of injury,
or
- Substantial compliance with the voluntary standard is unlikely.

Id. 2058(f)(3)(D). The Commission also must find that expected benefits of the rule bear a reasonable relationship to its costs and that the rule imposes the least burdensome requirements that would adequately reduce the risk of injury. *Id.* 2058(f)(3)(E) & (F).

III. Product Description

A portable generator is a consumer product that converts chemical energy from the fuel powering the engine to rotational energy, which in turn is converted to electrical power. The engine can be fueled by gasoline, liquified propane gas (LPG), natural gas, or diesel fuel. The generator has a receptacle panel that consumers use to connect appliances, power tools, or other electrical loads to the generator via a plug connection. These generators are designed for portability—specifically, to be carried, pulled, or pushed by a person.

Manufacturers and retailers advertise portable generators by many different features, but one of the primary features is the amount of electrical power the generator can provide continuously. The industry commonly refers to this as “rated power,” “rated wattage,” or

“running wattage,” which ranges from less than 1,000 watts (1 kilowatt or 1 kW) to approximately 20 kW.

IV. Risk of Injury

A. Description of Hazard – Acute CO Poisoning

Portable generators produce CO. CO is a colorless, odorless, poisonous gas formed during incomplete combustion¹³ of fossil fuels, which occurs in all fuel burning products to varying degrees. Engines like those in portable generators emit CO along with other exhaust gas constituents that have noxious odors. Section II.B of the briefing memorandum in Staff’s SNPR Briefing Package describes the effects of CO poisoning, and the relationship between exposure to CO and carboxyhemoglobin (COHb) levels in the body. Even after CO has reached a peak and is decreasing, such as when a generator shuts off, COHb will continue to rise for some time before it decreases.¹⁴

B. CO Fatalities Associated with Portable Generators

Based on the data from the reports in CPSC’s databases as of May 10, 2022, there have been at least 1,332 deaths associated with generators for years 2004 through 2021.^{15,16} Figure 1 shows the number of reported deaths involving a portable generator for each of the years in this

¹³ Incomplete combustion entails only partial burning of a fuel. CO is a byproduct from incomplete combustion of carbon.

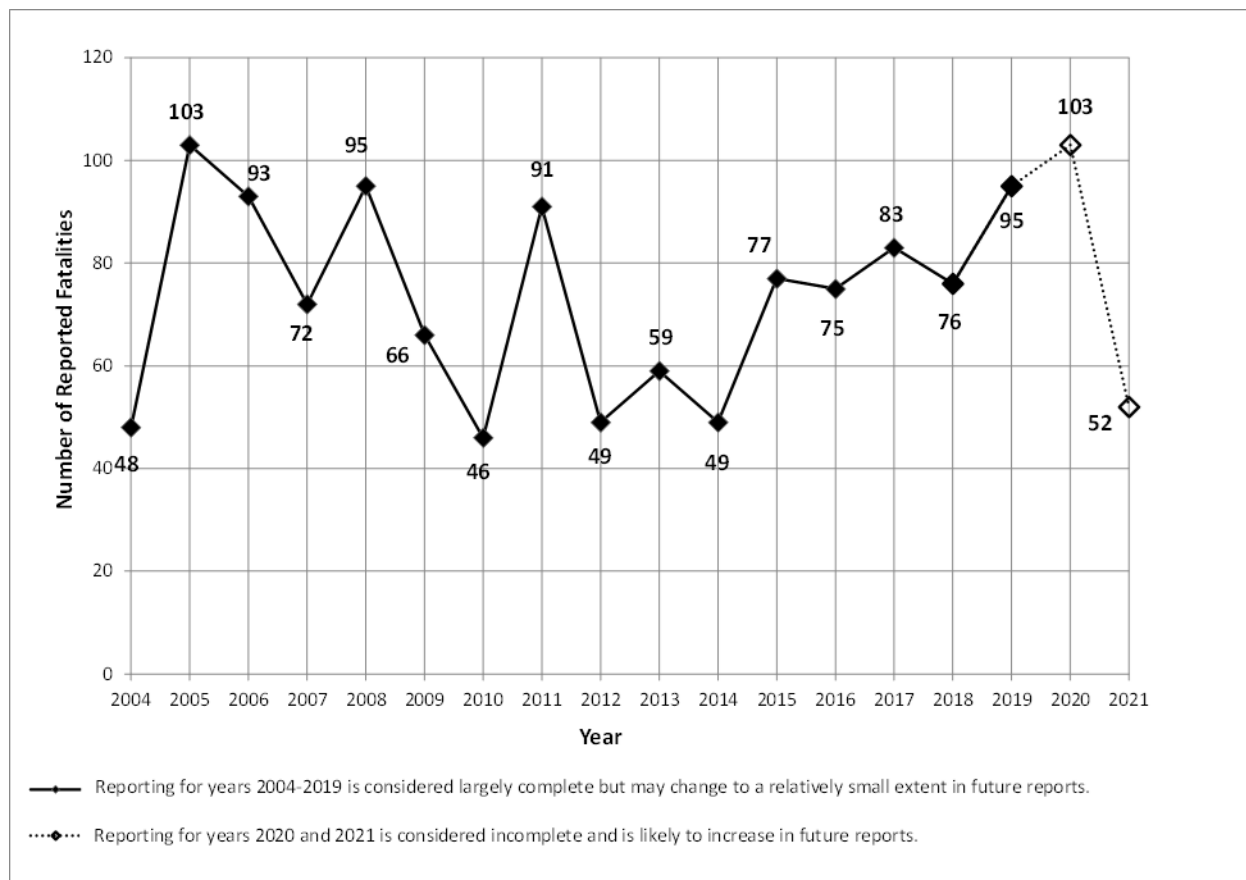
¹⁴ This is exemplified in test results presented in NIST Technical Note 2049 *Carbon Monoxide Concentrations and Carboxyhemoglobin Profiles from Portable Generators with a CO Safety Shutoff Operating in a Test House*, available online at <https://doi.org/10.6028/NIST.TN.2049>. In the vast majority of the tests, the peak COHb levels were attained hours after the generator shut off.

¹⁵ Death data for years 2004 through 2010 are from the following report, with an additional death included in 2004 that was reported in the NEISS data but was not previously accounted for: Hnatov, M.V., *Generators Involved in Fatal Incidents, by Generator Category, 2004-2014*, CPSC, Bethesda, MD, Sept. 2016. (TAB B in <https://www.cpsc.gov/s3fs-public/Proposed-Rule-Safety-Standard-for-Portable-Generators-October-5-2016.pdf>; Document ID CPSC-2006-0057-0032 in www.regulations.gov).

¹⁶ Death data for years 2011 through 2021 are from the following report, with 5 deaths from 3 incidents in 2011 excluded because they involved stationary generators, which are outside the scope of the proposed rule: Hnatov, M.V., *Fatal Incidents Associated with Non-Fire Carbon Monoxide Poisoning from Engine-Driven Generators and Other Engine-Driven Tools, 2011–2021*, CPSC, Bethesda, MD, June 2022 <https://www.cpsc.gov/content/Fatal-Incidents-Associated-with-Non-Fire-Carbon-Monoxide-Poisoning-from-Engine-Driven-Generators-and-Other-Engine-Driven-Tools-2011-2021> (Document ID CPSC-2006-0057-0108 in www.regulations.gov).

period. Data for the two most recent years, 2020 and 2021, are incomplete, because data collection is ongoing, and the death count most likely will increase in future reports.¹⁷

Figure 1. Number Of Reported Non-Fire CO Poisoning Deaths Involving Generators in CPSC Databases as of May 10, 2022, by Year, 2004-2021



The average number of generator-related CO fatalities in CPSC’s databases for the most recent 3 years of complete data (years 2017 through 2019) is 85 deaths per year.

C. Hazard Patterns of Fatal Incidents

CPSC Field Staff conducted in-depth investigations (IDI) on nearly all 1,332 deaths represented in Figure 1 to gather more detailed information about the incidents and to

¹⁷ For example, in staff’s annual report covering the years 2010 through 2020, the number of deaths entered in CPSC’s databases as of May 17, 2021 for the years 2019 and 2020 was 89 and 54, respectively. The deaths in these years increased to 95 and 103, respectively, in the June 2022 report, for which the data were pulled almost exactly one year later. See <https://www.cpsc.gov/content/Generators-and-OEDT-CO-Poisoning-Fatalities-Report-2021>.

characterize the hazard patterns. Two annual reports covering the 18-year period^{18,19} categorize the incidents and characterize the hazard patterns for these 1,332 fatalities, including, for example, the kind of structure in which the incident occurred (e.g., fixed-structure home, apartment, townhouse), the location of the generator, and the time of year of the incident.

D. CO Injuries from Portable Generators

Based on the CPSC's National Electronic Injury Surveillance System (NEISS) database, which is a national probability sample of approximately 100 hospitals in the United States and its territories, the Commission estimates that there were at least 23,318 CO injuries associated with generators that were seen in hospital Emergency Departments (EDs) for the 18-year period from 2004 through 2021. See Table 1.

Table 1. National Estimates of Injuries Associated with Generators Seen in Emergency Departments with Narratives Indicative of Carbon Monoxide Poisoning 2004-2021, By Disposition

NEISS Code	Treatment	Estimated Injuries	Coefficient of Variation	Sample Size	95% Confidence Interval
1	Treated and released, or examined and released without treatment	17,569	0.2612	450	8,575-26,563
6	Left without being seen/Left against medical advice				
2	Treated and transferred to another hospital	5,727	0.2864	149	2,512-8,942
4	Treated and admitted for hospitalization (within same facility)				
5	Held for observation (includes admitted for observation)				
8	Fatality, including dead on arrival, died in the ED, died after admission	*	*	1	*
9	Not recorded	*	*	1	*
	Total	23,318	0.2540	601	11,709-34,927

Source: U.S. Consumer Product Safety Commission National Electronic Injury Surveillance System and Children and Poisoning System, 2004- 2018.

Rows may not sum to the total due to rounding.

*Too few observations to produce an estimate

¹⁸ Hnatov, M.V., *Fatal Incidents Associated with Non-Fire Carbon Monoxide Poisoning from Engine-Driven Generators and Other Engine-Driven Tools, 2011–2021*, CPSC, Bethesda, MD, June 2022, <https://www.cpsc.gov/content/Fatal-Incidents-Associated-with-Non-Fire-Carbon-Monoxide-Poisoning-from-Engine-Driven-Generators-and-Other-Engine-Driven-Tools-2011-2021> (Document ID CPSC-2006-0057-0108 in www.regulations.gov).

¹⁹ Hnatov, M.V., *Incidents, Deaths, and In-Depth Investigations Associated with Non-Fire Carbon Monoxide from Engine-Driven Generators and Other Engine-Driven Tools, 2004-2014*, CPSC, Bethesda, MD, June 2015, <https://www.cpsc.gov/content/incidents-deaths-and-depth-investigations-associated-non-fire-carbon-monoxide-engine-1> (Document ID CPSC-2006-0057-0026 in www.regulations.gov).

Staff also estimated CO injuries using CPSC’s Injury Cost Model (ICM). The ICM estimates injuries treated in locations other than hospital EDs. For the years 2004 through 2021, staff estimates 1,580 injuries resulted in direct hospital admissions and 52,782 injuries resulted in a doctor’s or clinic’s visit. Combined with the NEISS estimates stated previously, this means that there were an estimated 77,658 nonfatal injuries that were treated in the same 18-year period. See Tab A of Staff’s SNPR Briefing Package.

V. Voluntary Standards

To issue a final rule under section 9(f)(3) of the CPSA if a voluntary standard addressing the risk of injury has been adopted and implemented, the Commission must find that:

- The voluntary standard is not likely to eliminate or adequately reduce the risk of injury,
- or*
- Substantial compliance with the voluntary standard is unlikely.

As mentioned in section I of this preamble, there are two voluntary standards with CO mitigation requirements intended to address the risk of acute CO poisoning from portable generators: UL 2201 and PGMA G300.

A. UL 2201

In 2002, UL convened a standards technical panel (STP) of stakeholders with varied interests and backgrounds to develop requirements for their safety standard for portable generators, UL 2201. On January 9, 2018, the STP voted to approve, and UL published, the ANSI-approved second edition of UL 2201.

Section 1 of UL 2201 2nd Edition provides that the requirements in UL 2201 apply to spark-ignited engines installed in portable generators for each fuel type recommended by the manufacturer.

Section 5.2.8 and section 5.3.3 of UL 2201 specify that the calculated weighted CO emission rate²⁰ of a generator shall not exceed 150 g/h, using the formula specified in sections 5.2.2 and 5.3.2 of UL 2201, respectively. Section 5.2.2 involves testing with the engine installed in the generator assembly, in the configuration when the consumer purchases it. Section 5.3.2 involves testing the standalone engine in accordance with the U.S. Environmental Protection Agency's (EPA) engine emission test procedure defined in Engine Testing Procedures, 40 CFR part 1065.

UL 2201 also includes shutoff requirements. Under section 6.5 of UL 2201 the generator must shut off when the CO concentration registers either:

1. 150 parts per million by volume (ppmv) of CO during a 10-minute rolling average²¹ (§ 6.5.3), or
2. an instantaneous reading of 400 ppmv (§ 6.5.2).²²

For the test method to verify compliance with the CO shutoff requirements, the generator is operated in a closed room and the room CO concentration is measured 1 foot above the centerline (the geometric center) of the generator. The generator must shut off when the CO measured above the generator meets either one of the shutoff concentrations. Any product certified to UL 2201 after publication of the 2nd Edition on January 9, 2018, must meet the requirements of the 2nd Edition.

B. PGMA G300-2018

In late 2016, PGMA's technical committee began developing CO hazard-mitigation requirements for its own standard, PGMA G300-2015. PGMA's efforts culminated on April 20,

²⁰ The weighted CO emission rate is calculated from the emission rates that are measured while each of six different prescribed loads are applied to either the engine or the generator (depending on which of the two the test methods in the proposed rule is used) and multiplying each emission rate with a prescribed weight factor, then summing the product of weight factor and emission rate for each of the six loads.

²¹ A rolling average is a calculation averaging data over an interval of time that changes its initial point and end point as specified by the duration of the time interval.

²² Parts per million by volume is a measurement of concentration on a volume basis. This is commonly used to measure the concentration of gas.

2018, after a canvass committee of stakeholders with varied interests and backgrounds voted to approve, and PGMA published, the ANSI-approved 2018 edition of PGMA G300.

Section 1 of PGMA G300-2018 provides that the standard applies to: “15 kW or smaller; single phase; 300 V or lower; 60 hertz; gasoline, liquefied petroleum gas (LPG) and diesel engine driven portable generators intended to be moved, though not necessarily with wheels.” According to section 1 of PGMA G300, permanent stationary generators, 50 hertz generators, marine generators, trailer mounted generators, generators in motor homes, generators intended to be pulled by vehicles, engine driven welding power sources and portable generators with AC output circuits that are not compatible with NEMA receptacles are not included within the scope of the standard.

PGMA G300-2018 has shutoff system requirements but does not have CO emission rate requirements. PGMA G300 includes a requirement for generators to be equipped with an onboard CO sensor that is certified to appropriate requirements in the U.S. voluntary standard for residential CO alarms, *UL 2034, Standard for Safety, Single and Multiple Station Carbon Monoxide Alarms*. Section 6.2.11.1 provides the acceptance criteria for the CO shutoff system. The CO sensor, when tested to the requirements in the standard, must shut off the generator before the CO concentration, when measured at a location 1 to 2 inches above the approximate center of the portable generator’s top surface, exceeds either 400 ppmv for a 10-minute rolling average of CO, or an instantaneous reading of 800 ppmv.

PGMA G300-2018 section 3.9.1.1 includes requirements for a self-monitoring system to detect the correct operation of the CO sensing element, loss of power source for the portable generator system for controlling CO exposure, and the end of life of the CO sensor. The standard requires that the self-monitoring system shut off the portable generator engine upon fault detection and end of life.

Section 3.9.1.2.1 requires that the portable generator system for controlling exposure be tamper resistant and specifies when a system is considered tamper resistant. According to

section 3.9.1.2.1, the system is considered tamper resistant when all parts that affect the proper operation of the portable generator system for controlling CO exposures meet at least one of the following: (1) the part is permanently sealed; (2) the part is not normally accessible by hand or with ordinary tools; or (3) removal or disconnection of the part prevents the engine from running. Section 3.9.1.2.1 allows for different parts of the portable generator system that control exposure to meet the requirement for tamper resistance using any of the options, provided all of the different parts meet at least one of the options.

Section 3.9.1.2.2 of PGMA G300-2018 requires that construction of the portable generator minimize the risk of intentional blockage of the gas inlet of the portable generator system for controlling CO exposure. Section 3.9.1.2.3 provides that the construction of the portable generator shall minimize the risk of incidental damage to the portable generator system for controlling CO exposure. Section 3.9.1.2.4 provides that the portable generator system for controlling CO exposure shall not incorporate any type of override function or feature.

PGMA G300-2018 includes construction and performance requirements for the CO sensor. Section 3.9.1 and 3.9.1.4 of PGMA G300 include requirements from UL 2034, *Single and Multiple Station Carbon Monoxide Alarms*, to address the construction and performance of the CO safety shutoff system.²³ UL 2034 provides design and performance requirements for CO alarms that cover topics related to the construction of the CO shutoff system such as gas and vapor interference, dust exposure, vibration, corrosion, and extreme temperature and humidity exposure. Additionally, section 3.9.1.4 of PGMA G300 requires that the shutoff system contain a carbon monoxide sensing element bearing a UL mark or equivalent Nationally Recognized Testing Laboratory (NRTL) mark, to indicate that the sensor is capable of meeting the requirements for use in UL 2034 compliant systems.

²³ Edition Date: March 31, 2017; ANSI approved: October 7, 2022. UL 2034 is available for free digital view at <https://www.shopulstandards.com/ProductDetail.aspx?UniqueKey=32610>.

PGMA G300-2018 also requires notification after a shutoff event. The PGMA G300 shutoff “notification” requirements consist of a “red indication” (§ 3.9.1.3.1) and associated product markings (§ 7.2.2.4).

The notification is required to be “a red indication,” but the indication is not required to be a light. The standard allows, but does not require, the indication to be “blinking, with a maximum period of 2 seconds.” § 3.9.1.3.1. The indication must remain for a minimum of 5 minutes after shutoff occurs unless the generator is restarted. Sections 3.9.1.3, 3.9.1.3.1, and 4.1.1.3 of PGMA G300 prescribe additional requirements for the indication.

PGMA G300 also requires product markings that relate to the notification system. These markings include the following, which must be “in a readily visible location” (§ 7.2.2.4):

- An identification of the hazard associated with tampering with the CO shutoff system.
- An identification and description of the CO shutoff system notifications that are “in close proximity to each CO shutoff notification.”
- An identification of the direction of the engine exhaust, including instructions to direct the exhaust away from occupied structures.
- A label about the automatic shutoff that instructs the consumer to move the generator to an open, outdoor area; point the exhaust away; not to run the generator in enclosed areas; and move to fresh air and get medical help if sick, dizzy, or weak. See Tab F of SNPR Staff Briefing Package. The label must be “in close proximity to the notification.”

C. Assessment of Compliance with UL 2201 and PGMA G300

In a February 1, 2023, letter to CPSC, PGMA states that at the end of 2022, “over 68% of PGMA member company generators shipped complied with the CO shutoff requirement in PGMA G300.”²⁴ This number, however, is limited to PGMA member companies, which

²⁴ See <https://www.regulations.gov/search?filter=cpsc-2006-0057-0111%20>.

represent a small fraction of all generator manufacturers (although those manufacturers account for a substantial percentage of total sales).

In 2021 and 2022, CPSC staff surveyed manufacturers regarding their production of compliant generators.²⁵ In both surveys, three manufacturers indicated that most or all their models comply with PGMA G300, and one of these manufacturers also stated its models are compliant with UL 2201. In 2021, four other manufacturers reported that their compliance rates with PGMA G300 were expected to increase substantially in the next year. However, in 2022, one of these firms responded to the updated 2022 survey and reported compliance rates that fell short of their target established the prior year. Based on this review, the unabated number of incidents as shown in Figure 1, and the market analysis discussed below, the Commission concludes that compliance with UL 2201 is limited while compliance with PGMA G300, although greater, is not sufficient to significantly reduce the risk of injury and death. Based on information provided by manufacturers and in market research, staff estimates a 30 percent compliance rate with PGMA G300's sensor and shutoff requirements as of 2022. One sixth of those PGMA-compliant units (or 5 percent of the total) are estimated to also be compliant with the emissions requirements of UL 2201. Even if compliance with PGMA G300 is greater than the estimated 30 percent, the G300 standard does not appear at present to have substantial compliance. Additionally, the Commission, as described in section IV.D of this preamble, assesses that the requirements in PGMA G300 are inadequate to reduce the risk of acute CO poisoning associated with portable generators.

D. Assessment of UL 2201 and PGMA G300

1. CO Emission Rate and Shutoff Levels

²⁵ Staff conducted surveys of a subset of large manufacturers in 2021 and 2022. In 2022, in addition to assessing compliance with the voluntary standards, staff obtained cost information regarding the required modifications to make portable generators compliant with each of these voluntary standards.

To evaluate the effectiveness of the CO mitigation requirements in UL 2201 and PGMA G300-2018, CPSC staff worked with NIST to simulate the scenarios of 511 fatalities that are known to CPSC, using an indoor air quality (IAQ) modeling program called “CONTAM.”²⁶ The 511 simulations are based on the actual deaths found in CPSC records over the 9-year period from 2004 through 2012 that occurred at fixed residential structures or similar structures. Staff completed approximately 140,000 simulations for 37 different house models and three detached garages, with various generator locations and generator sizes in 28 different weather conditions. Staff’s briefing package, “Assessment of Portable Generator Voluntary Standards’ Effectiveness in Addressing CO Hazard” (Feb. 16, 2022) provides a detailed description of these simulations.²⁷

Staff’s analysis of the simulation results found that under simulated conditions, generators compliant with the CO emission rate and shutoff requirements of the UL 2201 standard would avert nearly all of the 511 deaths, or nearly 100%, with three survivors requiring hospitalization, and 24 survivors seeking medical treatment and being released. Staff’s analysis found that generators compliant with the shutoff requirements of the PGMA G300-2018 standard would avert about 87 percent of the 511 deaths, resulting in 69 deaths, with 54 survivors requiring hospitalization and 88 survivors seeking medical treatment and being released. The results of that analysis are shown in Table 2.²⁸

²⁶ CONTAM is a multizone airflow and contaminant transport IAQ modeling program that was developed by NIST and has been used for several decades. It accurately models the buildup and transport of contaminants within, into, and out of a building. (Why delete?)

²⁷ https://www.cpsc.gov/s3fs-public/Briefing-Package-on-Portable-Generator-Voluntary-Standards.pdf?VersionId=hLnAkKQ6bCD_SKin8RE6Iax.BjZsB5x3 (Document Id number CPSC-2006-0057-0107 in www.Regulations.gov).

²⁸ Some of the results differ slightly from those previously published in staff’s briefing package on effectiveness of the voluntary standards because staff found a tabulation error in the analysis of the simulation results after publication. See Tab A of Staff’s SNPR Briefing Package.

Table 2. Results of effectiveness analysis of voluntary standards, based on simulations of 511 CO deaths in CPSC databases from generators, 2004-2012

Outcome for Operators and Collateral Occupants	Baseline vs. Standards		
	Baseline	G300	UL 2201
Fatality	511	68.50	0.04
Percentage of death averted versus baseline generators	- -	86.6%	99.99%
Survivors who are hospitalized or transferred to specialized treatment center	- -	54.22	3.22
Survivors who seek medical treatment and are treated and released	- -	87.96	24.28
Survivors who are likely not symptomatic and not seeking medical treatment	- -	300.42	483.56

2. Estimates of Deaths and Injuries Assuming Compliance with Either Voluntary Standard

This section discusses the fatalities in CPSC databases and provide estimates of generator-related CO deaths and injuries seen in EDs, if generators meeting either voluntary standard had been involved in those incidents. At least 1,332 fatalities occurred from 1,009 separate incidents in CPSC’s databases as of May 10, 2022, for the 18-year period 2004 through 2021.^{29,30}

The Commission applied the information from the simulations and actual fatal incidents to the NEISS injury estimates (and inputs from the Injury Cost Model) to derive the estimates of generator-related CO deaths, hospital admissions, and injuries seen in EDs if generators uniformly meeting one or the other voluntary standard had been used in the incident scenarios

²⁹ Death data for years 2004 through 2010 are from the following report, with an additional death included in 2004 that was reported in the NEISS data but was not previously accounted for: Hnatov, M.V., *Generators Involved in Fatal Incidents, by Generator Category, 2004-2014*, U.S. U.S. Consumer Product Safety Commission, Bethesda, MD, Sept. 2016 (TAB B in Document ID CPSC-2006-0057-0032 in www.regulations.gov).

³⁰ Death data for years 2011 through 2021 are from the following report, with 5 deaths from 3 incidents in 2011 excluded because they involved stationary generators, which are outside the scope of the proposed rule: Hnatov, M.V., *Fatal Incidents Associated with Non-Fire Carbon Monoxide Poisoning from Engine-Driven Generators and Other Engine-Driven Tools, 2011–2021*. U.S. Consumer Product Safety Commission, Bethesda, MD, June 2022 (Document ID CPSC-2006-0057-0108 in www.regulations.gov).

instead of the generators that actually were involved. The results are presented in Table 3 below. This estimation assumed that the distribution of NEISS injuries was similar to the distribution of 511 fatality scenarios used in the NIST simulations. In fact, because the simulations used in the effectiveness analysis accounted for the generator operating only outside in just 2 percent (8 of the 511) of the deaths, yet this scenario accounts for 6 percent (79 out of 1332) of the deaths in CPSC’s databases, unaddressed injuries from G300-compliant generators may exceed these estimates.

Table 3. Estimates of Generator-Related CO Deaths and Injuries Seen in EDs if Generators Meeting Either Voluntary Standard Had Been Involved, 2004-2021

Outcome for Operators and Collateral Occupants	Baseline vs. Standards		
	Baseline	G300	UL 2201
Fatalities	1332	183.77	0.09
Percentage of deaths averted versus baseline (BL) generators	- -	86.20%	99.99%
Survivors who are hospitalized or transferred to specialized treatment center	7307.67	1,136.54	8.85
Survivors who seek ED treatment and are treated and released	17,568.97	3,227.44	62.21
Survivors who visit doctor/clinic and are treated and released	52,781.62	9,544.73	242.20

The analysis found that under simulated conditions, generators compliant with the CO emission rate and shutoff requirements of the UL 2201 standard would avert nearly 100 percent of the 511, with three survivors requiring hospitalization, and 24 survivors seeking medical treatment and being released. Staff’s analysis found that generators compliant with the shutoff requirements of the PGMA G300 standard would avert about 87 percent of the deaths, resulting

in 69 deaths, with 54 survivors requiring hospitalization, and 88 survivors seeking medical treatment and being released. See Tab A of Staff's SNPR Briefing Package.

E. CO Shutoff System Requirements

The foregoing analysis demonstrates that UL 2201's weighted CO emission rate limit of 150 g/h and shutoff concentrations of 150 ppmv at a rolling 10-minute rolling average or an instantaneous measurement of 400 ppmv are extremely effective in the simulated conditions where the system, including shutoffs, operates as designed. To ensure that these simulated performance requirements are effective in real-world scenarios, however, the CO shutoff system must be reliable, functional, and durable.

1. Functionality of the CO Shutoff System

The analysis of the effectiveness of the performance requirements in the voluntary standards assumed the shutoff system functioned properly and shut the generator off when the shutoff criteria in each voluntary standard were met. If the shutoff system is bypassed, damaged, or overridden such that the generator can operate without the shutoff system functioning, or functioning properly, the effectiveness of the performance requirements would be reduced. Thus, requirements to maintain the functionality of the shutoff system are included in the proposed rule.

Specifically, as discussed in section IV.B. above, PGMA G300 has requirements regarding tamper resistance in sections 3.9.1.2.1. through 3.9.1.2.4. The Commission concludes that these requirements, with modifications as specified in section VI.C.5 of this preamble, are necessary and adequate to ensure the CO shutoff system maintain functionality.

2. Self-Monitoring of CO Shutoff System

Similarly, if the system has a fault, loss of power, or the system reaches end-of-life yet the generator operates without the shutoff system functioning, the effectiveness will be reduced. Therefore, the Commission assesses that requirements for self-monitoring of the shutoff system are necessary. PGMA G300 provides requirements for self-monitoring while UL 2201 does not.

PGMA G300's requirements in section 3.9.1.1 require that faults involving the CO sensing element, loss of power source for the CO shutoff system, and end of life condition, be applied one at a time to the system's circuitry while the engine is running. The engine is required to shut off after each fault or end of life is introduced. The Commission concludes that these self-monitoring requirements are necessary for ensuring proper functioning of the shutoff system. Thus, the requirements are included in the proposed rule.

3. Durability Requirements for the Shutoff System

Durable and reliable operation of the CO shutoff system also is critical for effectiveness. Section 3.9.1 and 3.9.1.4 of PGMA G300 includes requirements from UL 2034, *Single and Multiple Station Carbon Monoxide Alarms*, to address the construction and performance of the CO safety shutoff system. This standard is the leading U.S. standard for CO alarms and provides a robust set of requirements for CO alarms. CO alarms that meet the requirements of UL 2034 have demonstrated reliable operation for many years. UL 2034 provides design and performance requirements for CO alarms that cover topics related to the construction of the CO shutoff system such as gas and vapor interference, dust exposure, vibration, corrosion, and extreme temperature and humidity exposure. Additionally, section 3.9.1.4 of PGMA G300 requires that the carbon monoxide sensor used in the shutoff system have a UL mark or equivalent NRTL mark, which is indicative that the sensor is capable of meeting the requirements for use in UL 2034 compliant systems.

UL 2201 on its own is not adequate to address the CO shutoff system because it does not prescribe requirements for the construction of the CO shutoff system. If the system does not function properly because of conditions affecting its durability and ability to reliably shut the generator off when the shutoff criteria are met, the effectiveness will be reduced below the near-100 percent level modeled in the simulation by CPSC staff and NIST. The Commission concludes that the related construction and performance requirements in section 3.9.1 and 3.9.1.4 of PGMA G300, with the modification that the shutoff criteria need to correspond to those of the

proposed rule, are necessary to address the environmental conditions (gas and vapor interference, dust, vibration, corrosion, and variable temperature and humidity) that the shutoff system could be exposed to when mounted on a portable generator.

4. Test method to verify compliance with CO Shut-off Criteria

An effective test method must expose the CO safety shutoff system to CO concentrations that will initiate shutoff. The test method also must verify that the CO safety shutoff system functions properly or does not allow the generator to start when the power supply to the system is not functioning. The Commission assesses that the test method in PGMA G300 provides a reasonable foundation for a test method to reliably assess the safety shutoff system.

UL 2201 and PGMA G300 provide similar test methods for evaluating the performance of the CO safety shutoff system to a set of acceptance criteria. Both test the generator assembly in an enclosed space that is filled with exhaust emissions from the generator while an air sample is taken from above the generator to determine if the generator shuts off before the room reaches the shutoff acceptance criteria. Tab E of Staff's SNPR Briefing Package provides a detailed description of the test methods in PGMA G300 and UL 2201.

The Commission concludes that the test method in Section 6.2.11.2 of PGMA G300 and related definitions from Section 2 of PGMA G300 are generally appropriate to evaluate the CO safety shutoff system. However, some changes to the PGMA test method and definitions in Section 2 will result in better assessment of the CO safety shutoff system and therefore further reduce the risk of death and injury associated with portable generator CO poisoning.

Accordingly, the Commission is proposing to modify the test method as follows.

a) Test Room Volume and Dimensions: The Commission preliminarily assesses that it is not necessary for the room volume to be constrained to the volumes identified in PGMA G300 or UL 2201, and additional flexibility is appropriate. Currently, there are generators on the market that certify to UL 2201 and generators on the market that certify to PGMA G300; therefore, testing has been performed using both ranges of test room volumes specified in each standard.

Increasing the range of volumes to 895 – 2100 ft³ (25.34 – 59.47 m³)—a greater range than in either test alone—encompasses the ranges specified in both standards. Accordingly, the proposed rule specifies that the test room shall be designed such that the room volume is between 895 – 2100 ft³ (25.34 – 59.47 m³) with a ceiling height between 8 -12 ft (2.44 - 3.66 m) and be capable of meeting the requirements for generator position.

b) Test Room Air Inlet and Outlet Specifications: PGMA G300’s test method does not specify the location and dimensions of the air inlet and outlet of the test room. The Commission preliminarily assesses that specifying the location and dimensions of the air inlet and outlet is necessary because the air flow near the inlet and outlet could affect CO concentrations near the onboard sensor or the sample port for the CO analyzer. Accordingly, the proposed rule defines the location of the air inlet and outlet by specifying their configuration based on performance. Specifically, the proposed rule requires that the configuration of the air inlet and outlet for ventilation be designed such that neither port creates a flow directly onto or near the CO analyzer sample port above the generator or the CO sensor onboard the generator that is used as part of the CO safety shutoff system.

c) Ventilation: PGMA G300 does not specify a requirement for how ventilation is induced. Requiring a fan on the air outlet will ensure that the ventilation system will not create a positive pressure within the room. A scenario with no ventilation, or 0 air changes per hour (ACH), induced by an air inlet fan can pose a safety risk to test operators because the pressure in the room may exceed the pressure outside of the room as the generator heats the space. This could result in leakage from the test room. Specifying a minimum of 0.1 ACH will create a slightly negative pressure in the room, which will assist in preventing leakage. Accordingly, the Commission is proposing to change the ventilation range from “0 – 1.0 ACH” as stated in the PGMA G300 standard to “0.1 – 1.0 ACH,” to reduce the potential of gas leakage from the test room. Additionally, the Commission is requiring an exhaust fan on the air outlet to induce ventilation from the room and prescribing that no air inlet fan can be used. The proposed rule

requires that the ventilation rate of the test room shall be between 0.1 – 1.0 ACH and ventilation shall be induced by a fan on the air outlet.

d) Generator Position within the Room: The Commission proposes that it is necessary to provide constraints on the position of the generator to accommodate different test room dimensions. These constraints address concerns related to airflow around the CO sensor onboard the generator and CO analyzer sampling port, as well as exhaust gas diffusion within the space. Accordingly, the proposed rule requires that the generator be positioned such that the exhaust jet centerline is along one of the test room centerlines; the exhaust outlet on the generator be at least 6 ft (1.83 m) from the opposite wall; the outer surfaces of the generator housing or frame are at least 3 ft (0.91 m) from the walls on all other sides; and the onboard CO sensor used for the CO safety shutoff system be at least 1 ft (0.30 m) away from any obstruction.

e) CO Measurement Location: PGMA G300 specifies that the CO sample port, which is used in conjunction with the CO analyzer to measure the concentration of CO above the generator, be placed 1 to 2 inches above the approximate center of the generator's top surface. CPSC staff has assessed that this location is too close to the generator and the sample may be affected by low flow/mixing conditions present near the surfaces of the generator. Accordingly, the Commission is proposing to increase the height of the CO sample port above the generator. The proposed rule requires that the CO sample port connected to the CO analyzer for determining room concentration shall be placed 1 ft (0.30 m) above the center point of the top of the generator.

f) Load Bank and Power Meter Specifications: The load bank is used to apply an electrical load on the generator. Applying an electrical load to the generator will simulate the conditions of a generator under typical use. PGMA G300 specifies a range of requirements for a voltmeter, wattmeter, ammeter, frequency sensor, and load bank. These requirements include tolerances for measurement of true root mean square (RMS) voltage, wattage, and current. The Commission believes that these requirements are unnecessary and an exact load or associated emission rate is not required to test the CO safety shutoff system. Instead, the proposed rule reflects the

Commission’s preliminary assessment that a resistive load bank and power meter with an accuracy of 5 percent is sufficient to achieve the goals of testing.

5. PGMA G300 Shutoff Notification Requirements

PGMA G300 includes several requirements specific to notifying consumers if the generator automatically shuts off in response to detecting sufficiently high levels of CO in its vicinity. In contrast, UL 2201 lacks such notification requirements, even though it, too, includes CO shutoff performance requirements. The Commission considers CO shutoff notification requirements to be reasonably necessary for any portable generator standard that includes CO shutoff performance requirements.

The PGMA G300 shutoff “notification” requirements consist of two main parts: (1) a “red indication” (section 3.9.1.3.1) and (2) associated product markings. However, the voluntary standard does not specify many of the qualities of the “red indication.” For example, the G300 standard permits the indication to be “blinking, with a maximum period of 2 seconds” (§ 3.9.1.3.1), but this is not required and there is no requirement for the indication to be illuminated. However, the standard does require that the indication:

- Be able to be viewed by a user with normal vision, under expected visibility conditions (§ 3.9.1.3);
- Be “prominent and conspicuous ... in a readily visible location” that is “not easily obscured during use” (§ 3.9.1.3);
- Contrast with the background color (§ 3.9.1.3);
- “[R]emain” for at least 5 minutes after shutoff occurs, or until the generator is restarted (§ 3.9.1.3.1);
- Not be present if the generator is restarted (§ 3.9.1.3.1); and
- Be labeled or marked with an indication of its function and the required action to activate its function (§ 4.1.1.1.3).

As noted, the PGMA G300 standard also requires product markings that relate to the notification system. These markings include the following, which must be “in a readily visible location” (§ 7.2.2.4):

- An identification of the hazard associated with tampering with the CO shutoff system;
- An identification and description of the CO shutoff system notifications that are “in close proximity to each CO shutoff notification”;
- An identification of the engine exhaust, including instructions to direct the exhaust away from occupied structures;
- A label, “in close proximity to the notification,” with the content as shown in Tab F, Figure 26 of the Staff’s SNPR Briefing Package, or as “Figure 5 – User instruction label” in PGMA G300.

a) Notification Indicator Requirements

The Commission considers the notification requirements in PGMA G300 to be a reasonable foundation for similar requirements in the proposed rule. However, the Commission preliminarily considers the “indication” requirements specified in PGMA G300 to be insufficient for the proposed rule, for the reasons outlined below, and concludes that the following revisions are reasonably necessary to further reduce the risk of injury or death associated with portable generators. Tab F of the Staff’s SNPR Briefing Package provides a detailed discussion of the rationale for these changes.

- *Require that the “red indication” be illuminated.* PGMA G300 permits, but does not require, the “red indication” to be “blinking” and does not require the indication to be illuminated. Human engineering and human factors guidelines for displays most commonly recommend illuminated (also known as “transilluminated”) indicators, generally taking the form of simple indicator lights or legend lights for detectability. Red indicator lights typically are used to alert operators that a system is inoperative, that

corrective action is needed to restore operation, or that there has been a malfunction.

Thus, the proposed rule requires that the red light be illuminated.

- *Require the indicator to meet visibility and conspicuousness requirements for a consumer positioned in front of the startup controls.* PGMA G300 specifies that the indication must be prominent, conspicuous, and in a “readily visible location” that is “not easily obscured during use.” The Commission generally agrees with these requirements but believes additional specificity about where around the generator one would make these assessments would be beneficial. Positioning the indicator, and associated label, so they are prominent, conspicuous, and not obscured when viewed from the startup controls increases the likelihood that consumers will notice the indicator and follow the recommended action before restarting. Accordingly, the proposed rule specifies such placement.
- *Require the red indicator to be at least 0.4 inches diameter in size.* PGMA G300 does not include any size requirements for the indication, meaning an indication of any size would be permitted. Based on the analysis in Tab F of Staff’s SNPR Briefing Package, the Commission considers a minimum indicator size of 0.4 inches, or 10 mm, diameter to be a reasonable requirement.
- *Specify that the indicator, if flashing, must flash at a rate of between 3 and 10 Hertz (Hz), with equivalent light and dark durations.* Although the Commission does not consider requiring a flashing light to be necessary, if a manufacturer chooses to use a flashing light, then it should be no less visible than a steady light. The proposed rule therefore specifies that the indicator, if flashing, must be at a more detectable flash rate, with equal light and dark periods.

In addition to the proposed requirements above, the Commission seeks public comments on the following issues:

- *Minimum indicator brightness or luminance.* PGMA G300 does not specify the brightness of the indication. The Commission seeks comments regarding whether a minimum luminance requirement is needed for the notification indicator, and if so, what would be an appropriate requirement.
- *Minimum indicator duration, if not restarted.* PGMA G300 specifies that the indicator must “remain” for at least 5 minutes after shutoff occurs, or until the portable generator is restarted. Although the Commission agrees that the indicator should not remain illuminated after the generator has restarted, we question whether 5 minutes is an appropriate minimum duration for the indicator to remain. A more appropriate requirement would base the duration on the amount of time needed before CO concentrations in the environment have dropped to a reasonably safe level. The Commission is uncertain whether 5 minutes achieves this goal, particularly given the range of possible environmental conditions. Therefore, the Commission seeks public comment on this issue.
- *Shutoff Notification for visually impaired consumers.* The Commission seeks public comment on the need for shutoff notification requirements that are accessible to consumers other than “a user with normal vision,” such as an audible warning to alert visually impaired consumers when a portable generator shuts off and a means to communicate actions to take in response to the shutoff to reduce the risk of CO poisoning.

b.) Labeling for the CO Shutoff System

The Commission considers the notification-related marking and labeling requirements in PGMA G300 to be a reasonable basis for similar requirements in the proposed rule for portable generators. For example, the Commission agrees with the PGMA G300 requirements for portable generators to be marked with the location of the engine exhaust and instructions to direct the exhaust away from occupied structures, and the requirement is worded in a way that

allows for substantial flexibility regarding how to communicate these two issues. The Commission also agrees with the PGMA G300 requirement for portable generators to be marked for the “hazard due to tampering with” the CO shutoff system and to identify and describe the CO shutoff system notifications “in close proximity to each CO shutoff notification.”

However, for the reasons given below and explained more fully in Tab F of the Staff’s SNPR Briefing Package, the Commission concludes that the PGMA G300 requirements specific to the label are insufficient and the following revisions are reasonably necessary to adequately reduce the risk of injury or death associated with CO emissions from portable generators.

- *Require the label to be located no more than 0.25 inches from the notification indicator, or for the indicator to be incorporated into the label.* PGMA G300 specifies that the notification label must be “in a readily visible location ... in close proximity to the notification” (§ 7.2.2.4); however, it is unclear how “close” the label must be to the notification indicator to meet the requirement. Given that the label is intended to communicate to consumers what must be done when the CO shutoff system activates, and for clarity of administration, the Commission is proposing that the label be located where consumers are likely to be looking when they are notified that the generator has shut off due to elevated CO levels.
- *State explicitly why the generator shutoff.* The label specified in PGMA G300 instructs consumers what to do in response to the generator shutting off but does not explain why the generator shut off. Consumers should not be required to infer why they should move the generator, and an explicit description of the potential hazard associated with not performing the recommended action is likely to increase consumers’ motivation to comply. Thus, the Commission proposes that the phrase “YOU MUST” be replaced with “HIGH LEVELS OF CARBON MONOXIDE.” Figure 27 in Tab F of Staff’s SNPR Briefing Package provides an illustration of how this change may be accomplished.

- *Use sentence capitalization rather than all-uppercase text, except when highlighting key phrases.* Words in all-uppercase text are less legible than words in lowercase text, and all-uppercase text is less readable than mixed-case text (*i.e.*, both uppercase and lowercase letters) particularly under low-light conditions or for longer strings of text.
- *Clarify that the generator must be moved before restarting the generator, and reduce redundancy with the mandatory DANGER label.* This change advances the primary function of the notification label, *i.e.*, to explain why the generator shut off, and what actions the consumer should take before restarting the generator. The label is not intended to reiterate the information that is already present on the mandatory DANGER label. The Commission is also proposing that consumers be told upfront to move the generator to a “more open” outdoor area “before restarting,” to emphasize that moving the generator is directly relevant to restarting the generator, and to make it clear that even if consumers believed that the generator was already in an open area, the generator must be moved to a *more* open area.
- *Add sizing requirements for the label.* PGMA G300 currently does not include any requirements for the size of the label, suggesting that a label of any size, even one too small to be reasonably legible or readable, would be permitted. In the label presented in the PGMA G300 standard document itself, the header text measures approximately 0.12 inches in height and the remaining text is printed in text whose uppercase letters measure about 0.10 inches in height. The Commission considers these to be reasonable dimensions and the proposed rule specifies these as the minimum text size for the label.

VI. Description of the Proposed Rule

This section summarizes the provisions of the proposed rule to improve the safety of portable generators.³¹

³¹ Note the change in the CFR Part. The NPR proposed to add a new Part 1241. Because Part 1241 is now associated with a final regulation, this SNPR proposes to add a new Part 1281.

A. Description of Proposed Section 1281.1 – Scope, application, and effective Date

Proposed section 1281.1 provides that new part 1281 establishes a consumer product safety standard for portable generators to address the acute CO poisoning hazard associated with portable generators.

Proposed section 1281.1 provides that, for purposes of the rule, portable generators include single-phase, 300 V or lower, 60-hertz generators that are provided with receptacle outlets for alternating current (AC) output circuits and intended to be moved by the consumer, although not necessarily with wheels. The engines in these portable generators are small, nonroad spark-ignition engines, based on the EPA's engine classifications per 40 CFR 1054.801, and are fueled by gasoline, LPG, or natural gas. Proposed section 1281.1 provides that, for purposes of this rule, portable generators do not include:

- (1) Permanent stationary generators;
- (2) 50-hertz generators;
- (3) Marine generators;
- (4) Generators solely intended to be pulled by, or mounted on vehicles;
- (5) Generators permanently mounted in recreational vehicles or motor homes;
- (6) Generators powered by compression-ignition engines fueled by diesel;
- (7) Industrial-type generators intended solely for connection to a temporary circuit

breaker panel at a jobsite.

Proposed section 1281.1 provides that the rule would apply to generators manufactured after 180 days following publication of the final rule in the *Federal Register*.

B. Description of Proposed Section 1281.2 – Definitions

Proposed section 1281.2 provides definitions that apply for purposes of part 1281, in addition to the definitions in section 3 of the CPSA (15 U.S.C. 2051). These definitions include: units of measurement; maximum available observed wattage; air change rate; CO analyzer; engine; ordinary tools; portable generator system for controlling CO exposure; rated wattage; CO

shutoff system, and test room. Many of these definitions define terms that are used in the incorporated voluntary standards.

C. Description of Proposed Section 1281.3 – Requirements.

Proposed section 1281.3 sets forth the requirements for portable generators.

1. CO Emission Rate Requirements (§ 1281.3(a))

The Commission proposes to require that, as specified in sections 5.2.8 and 5.3.3 of UL 2201, portable generators shall emit no more than a weighted CO rate of 150 g/h, when tested to one of two methods specified in sections 5.2.2 and 5.3.2 of UL 2201. The first method measures the CO emission rate with the engine installed in the generator assembly, in the configuration as purchased by the consumer. The second method measures the CO emission rate of a standalone engine mounted on a dynamometer.

2. CO Shutoff Construction Requirements. (§1281.3(b))

Section 3.9.1 of PGMA G300 prescribes concentrations required to be achieved in the test chamber for purposes of determining activation to the CO shutoff requirements. The Commission proposes to require that portable generators meet section 3.9.1 of PGMA G300, with changes to the concentrations to align the concentrations required to be achieved in the test chamber with the shutoff concentration requirements in UL 2201. Testing to these modified concentrations ensures that the sensor is tested to the full range of concentrations within the bounds of the shutoff requirements in UL 2201.

3. Shutoff Requirements (§1281.3(c) and (d))

The Commission proposes to require that portable generators meet the shutoff levels in UL 2201, specifically, CO concentrations of 400 ppm instantaneous or 150 ppm for a 10-minute rolling average, measured above the generator during compliance testing, in place of the concentrations in section 6.2.11.1 of PGMA G300. The Commission proposes to require that the portable generator be tested in accordance with section 6.2.11.2 of PGMA G300, using the proposed definition of “test room” in section 1281.2 for purposes of the test.

4. Self-Monitoring System (§1281.3(e))

The Commission proposes requirements for self-monitoring of the portable generator. Section 1281.3(e) requires that, pursuant to section 3.9.1.1 of PGMA G300, faults indicative of a fault with the CO sensing element, loss of power source for the CO shutoff system, and end-of-life condition, be applied one at a time to the system's circuitry while the engine is running. The engine is required to shut off after each fault or end of life is introduced.

5. Tamper Resistance (§1281.3(f))

Section 1281.3(f) proposes requirements for tamper resistance for a portable generator system for controlling exposures. The system is considered tamper resistant when any part that is shorted, disconnected, or removed to disable the operation of the system prevents the engine from running. In addition, all parts, including wiring, that affect proper operation of the portable generator system for controlling CO exposure, must be (a) permanently sealed or (b) not normally accessible by hand or with ordinary tools. Under section 1281.3(f)(1), it is permissible for different parts of the portable generator system for controlling CO exposure to meet either option (a) or (b), provided all of the different parts meet at least one of these two options.

In addition, section 1281(f)(2) would require that, pursuant to PGMA G300, the construction of the portable generator must minimize the risk of intentional blockage of the portable generator's system for controlling CO exposure and minimize the risk of incidental damage to that system. The portable generator system for controlling exposure is not permitted to incorporate any type of override function or feature.

6. Notification (§ 1281.3(g))

Section 1281.3(g) includes CO shutoff notification requirements. The proposed rule requires that the portable generator system for controlling CO exposure include a prominent and conspicuous notification in a readily visible location to a consumer who is positioned in front of the start-up controls. The portable generator system for controlling CO exposure must provide a notification after a CO shutoff event. The notification must be at least 0.4 inches (10mm) in

diameter, illuminated and, if flashing, must flash at a rate of between 3 and 10 Hertz (Hz), with equivalent light and dark durations. Section 1281.3(g) requires a non-red system fault event notification if an end-of-life condition or a system electrically detectable fault is present, except for loss of the power source for the portable generator system for controlling CO exposure.

7. Carbon Monoxide Sensor (§ 1281.3(h))

The Commission proposes to require that a portable generator system for controlling exposure contain a carbon monoxide sensing element bearing the UL recognized Component Mark or an equivalent NRTL component mark.

8. Shut-Down Safety (§ 1281.3(i))

As specified in section 4.1.1.3 of PGMA G300-2018, the Commission proposes to require that portable generators be equipped with a means for shut-down that requires only one action and overrides all run commands. Additionally, as specified in PGMA G300-2018, a minimum of one shut-down mechanism shall be open for access at all times and shall not be positioned in such a manner that requires the removal or opening of any material that requires use of a tool, and all shut down mechanisms are to be labeled or marked with an indication of their function and the required action to activate the function.

9. Marking, Labeling, and Instructional Requirements (§ 1281.3(j))

Section 1281.3(j) of the proposed rule incorporates the requirements pertaining to the operator's manual, operating instructions, and warnings from section 8 of PGMA G300-2018. The Commission proposes to include Figure 5 from PGMA G300-2018 (see Tab F of Staff NPR Briefing Package) with the following changes: the label is to be located not more than 0.25 inches from the notification indicator, or the indicator is to be incorporated into the label; the header must read "AUTOMATIC SHUTOFF – HIGH LEVELS OF CARBON MONOXIDE"; use sentence capitalization rather than all-uppercase text in the message panels, except when highlighting key phrases; revise the language to clarify that the generator must be moved before restarting the generator, and to reduce redundancy with the content of the mandatory DANGER

label; the size height of the text in the header must be at least 0.12 inches, and all other text in the label must be sized so the height of its uppercase letters measure at least 0.1 inches.

Table 4 summarizes the performance and labeling requirements of the proposed rule and provides a comparison with the corresponding requirements in PGMA G300 and UL 2201.

Table 4. Requirements of the Proposed Rule versus Voluntary Standards

Requirement	PGMA G300	UL 2201	Proposed Rule
Limit weighted CO emissions rate of portable generator to a maximum of 150 g/h, including test methods for verifying compliance		✓	✓
			<i>Same as UL 2201</i>
Require the generator to shut off before the concentration measured above the generator exceeds a threshold for either an instantaneous reading or 10-minute rolling average	✓	✓	✓
	<i>800 ppmv instantaneous & 400 ppmv over 10 minute average</i>	<i>400 ppmv instantaneous & 150 ppmv over 10 minute average</i>	<i>Same concentrations as UL 2201</i>
Test Method for Verifying Compliance with CO shutoff requirement	✓	✓	✓
			<i>PGMA G300 with modifications</i>
Sensor/Shutoff System - Maintaining functionality	✓		✓
			<i>PGMA G300 with modifications</i>
Sensor/Shutoff System - Self-monitoring	✓		✓
			<i>Same as PGMA G300</i>
Sensor/Shutoff System - Durability & Reliability	✓		✓
			<i>Same as PGMA G300</i>
Notification, Markings, and Labeling	✓		✓
			<i>PGMA G300 with modifications</i>

D. Description of Proposed Section 1281.4 – Prohibited Stockpiling

Pursuant to section 9(g)(2) of the CPSA, 15 U.S.C. 2058(g)(2), the proposed rule would prohibit a manufacturer from “stockpiling” or substantially increasing the manufacture or importation of noncompliant portable generators between the promulgation of the final rule and

the effective date. The provision, which is explained more fully in Tab B of Staff's SNPR Briefing Package, would prohibit the manufacture or importation of noncompliant products at a rate that is greater than 105 percent at which the firm manufactured and/or imported portable generators during the base period. The base period is the calendar month with the median manufacturing or import volume within the last 13 months immediately preceding the month of promulgation of the final rule.

The Commission seeks comment on these proposals.

E. Proposed Findings – Section 1281.5

The findings required by section 9 of the CPSA are discussed throughout this preamble and set forth in section 1281.5 of the proposed rule.

VII. Preliminary Regulatory Analysis

Pursuant to section 9(c) of the CPSA, publication of a proposed rule must include a preliminary regulatory analysis containing:

- A preliminary description of the potential benefits and potential costs of the proposed rule, including any benefits or costs that cannot be quantified in monetary terms, and an identification of those likely to receive the benefits and bear the costs.
- A discussion of why a relevant voluntary safety standard would not eliminate or adequately reduce the risk of injury addressed by the proposed rule.
- A description of any reasonable alternatives to the proposed rule, together with a summary description of their potential costs and benefits and why such alternatives should not be published as a proposed rule.

This preamble contains a summary of the preliminary regulatory analysis for the proposed rule. Tab B of Staff's SNPR Briefing Package contains a detailed analysis.

A. Market Information

1. The Product

Portable generators have historically been the leading product among all engine-driven tools (EDTs) to cause non-fire CO poisoning deaths and injuries to consumers, accounting for over 90 percent of the 900 reported fatalities associated with all EDTs during the period 2011 to 2021, and 88 percent of the 710 EDT incidents that occurred in this period. The pattern of deaths and injuries has not subsided over time. While data collection is ongoing, the number of CO deaths caused by portable generators in year 2020 is likely to exceed the highest number of annual deaths (103) that was previously reported, in 2005.

The expected useful life of portable generators is largely a function of engine size, loads placed upon the unit, hours of use, and appropriate maintenance and storage. Staff's evaluation of data on historical sales in relation to surveys of product ownership suggests an expected useful product life of 11 years.

New series of portable generator models are introduced every year. Staff estimates that the average shelf life (period when a particular model is on the market) for a specific model is 12 years. Staff assumes the market has reached a steady state in the number of models available for sale. Under this assumption, firms introduce new models to essentially replace retiring models. Staff collected retail prices of 108 portable generators of various sizes from top selling manufacturers. The weighted average price across different sizes of portable generators from that sample of models is \$1,000.

2. Current Market Trends for Portable Generators

Staff identified 110 manufacturers of portable generators sold in the United States in 2021. The largest 10 firms by volume sold accounted for roughly 70 percent of sales. Top sellers fluctuate yearly, but a majority of the top 10 firms each year are U.S. based companies. In recent years, portable generators manufactured in the U.S. represented between 55 and 60 percent of all portable generator sales.

Staff used multiple sources to estimate portable generator sales in 2021 of 2.1 million units, which results in total revenue for the portable generator industry of \$2.1 billion. Staff estimated the total number of portable generators in use to be 21.46 million in 2021. Staff estimated the number of individual models available for sale each year from the Power Systems Research sales dataset; in 2021, there were a total of 1,355 models for sale in the U.S. Staff also produced estimates of the number of new portable generator models introduced each year, as well as the total number of models for sale in any given year within the time horizon of the analysis. Based on staff's estimations, there was a net gain of six additional models available for sale in 2021. See Tab B of Staff's SNPR Briefing Package.

3. Future Market Size for Portable Generators

Consumer demand for portable generators fluctuates annually with power outages, which are generally caused by hurricanes and other storms along the Gulf and Atlantic coasts, or by winter storms in other areas. Power outages or the presence of storms create periods of increased demand for portable generators that tend to be followed by periods of reduced demand, because the purchases in the prior period saturated a portion of the market demand. This cyclicity of demand can impact the industry, whose inventories and orders vary along the same continuum.

In spite of this cyclicity of demand, staff projected future sales at a rate of growth that is unrelated to the occurrence of specific weather events. Staff postulates that the sales of portable generators are linked in the long run to the growth in the number of households in the U.S.; however, due to the increased frequency of weather events in the last decades and the predictions of more frequent and severe storms in the future,³² staff expects demand for portable generator to grow more quickly than the expected growth in the number of households over time. See TAB B of Staff's SNPR Briefing Package for additional information regarding this analysis.

³² See the U.S. Environmental Protection Agency's Climate Change Indicators at [Climate Change Indicators: Weather and Climate | US EPA](#).

Staff estimated the rate of growth of portable generator sales for the 30-year period of analysis, as displayed in Table 5.

Table 5. Growth Rate of Portable Generator Sales, 2022-2053

Growth Rates in Sales	Population Growth Rates	Household Growth: 1.26 × Population Growth	Sales Growth: 2.13 × Household Growth
2022 - 2030	0.60%	0.75%	1.60%
2030 - 2040	0.46%	0.58%	1.24%
2040 - 2050	0.37%	0.46%	0.98%
2050 - 2053	0.29%	0.37%	0.78%

Figure 2 displays projected portable generator sales from 2024 through 2053 in the absence of the proposed rule and distinguishes their compliance with either of the voluntary standards: PGMA G300 or UL 2201.³³ Based on information provided by manufacturers and in market research, staff estimates a 30 percent compliance rate with PGMA G300's sensor and shutoff requirements. One-sixth of those PGMA-compliant units (or 5 percent of the total) are estimated to also be compliant with the emissions requirements of UL 2201. Staff assumed that in the absence of the proposed rule those compliance rates would continue into the future.

³³ Staff assumed that if a generator complies with the emission requirements included in UL 2201, it also complies with the sensor / shutoff requirements from PGMA G300; therefore, some portable generators comply with the sensor/shutoff requirements only, while others would comply with both sensor/shutoff and emission requirements.

Figure 2: Portable Generator Forecast of Sales by Compliance Status, 2024-2053

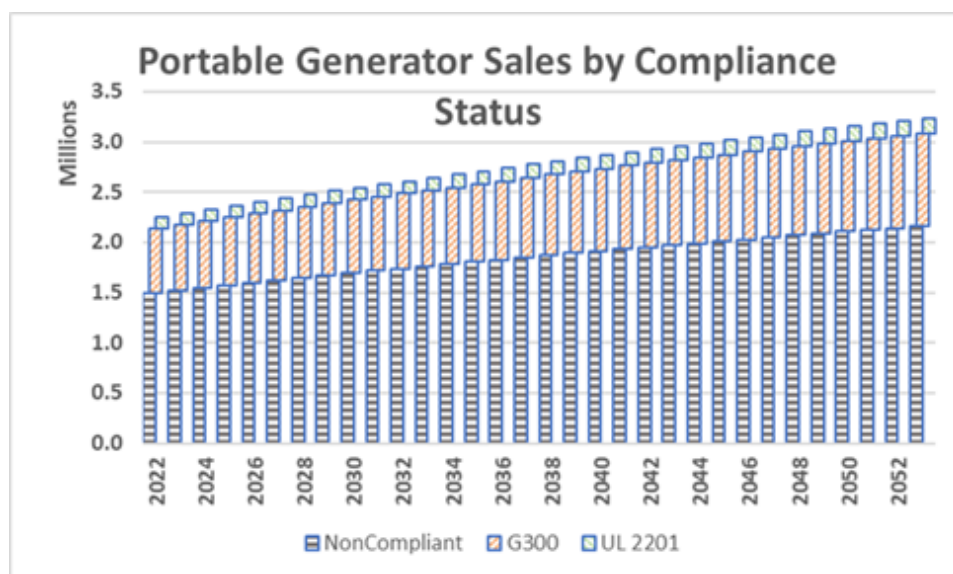


Figure 2 shows that under these assumptions the number of portable generators sold per year is expected to reach three million units by 2045, and close to 3.25 million units by the end of the period of analysis.

Portable generators have an expected product life of 11 years. Staff used forecasted sales and the expected product life with a statistical distribution to estimate the likelihood of their continued use by consumers, and as a result produced an estimate of the total number of portable generators in use every year during the 30-year period of the analysis. Figure 3 shows the estimated number of products in use without the implementation of the proposed rule.

Figure 3: Forecast of Portable Generators in Use by Compliance Status, 2022-2053

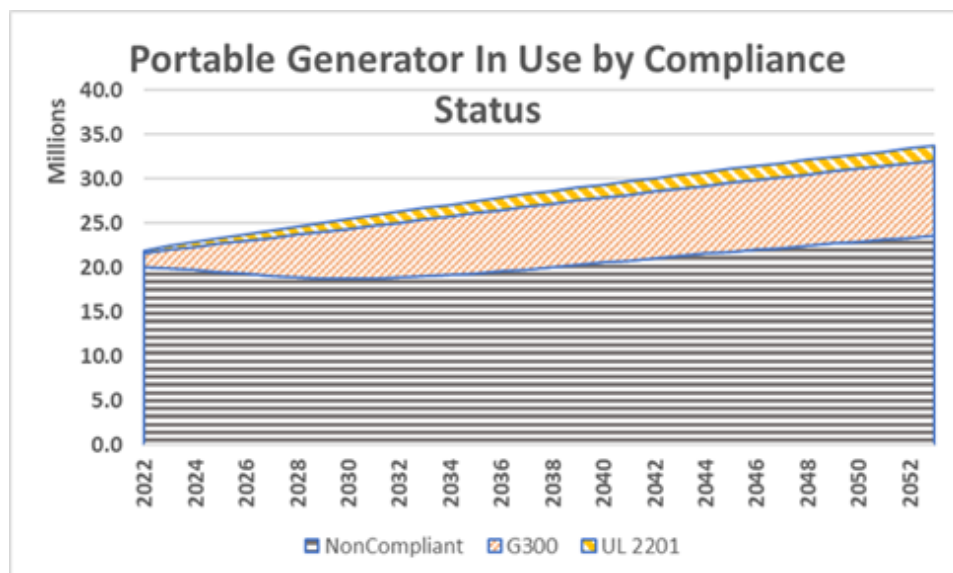


Figure 3 shows that under staff's assumptions the number of portable generators that would be in use without the proposed rule are roughly 22 million in 2022 and expected to grow by more than 50 percent over the next 30 years. By 2053, staff estimates that the total number of portable generators in use will reach nearly 34 million. The share of noncompliant portable generators decreases over time, from 91.4 percent in 2022, to 70 percent by 2053, matching the share of noncompliant portable generators continuing to be sold on a year-by-year basis, as older noncompliant units are retired.

Staff also estimated the number of models available for sale each year during the period of analysis, as well as the number of new models introduced each year. Staff concluded that the number of models has essentially reached a steady state and that the number of new models introduced each year replaces models being retired at a rate of 8.3 percent per year. Staff estimates that approximately 113 or 114 new portable generator models are introduced each year. The number of models available for sale will reach 1,414 in 2023, and only 1,424 in 2053.

B. Preliminary Regulatory Analysis: Cost Analysis

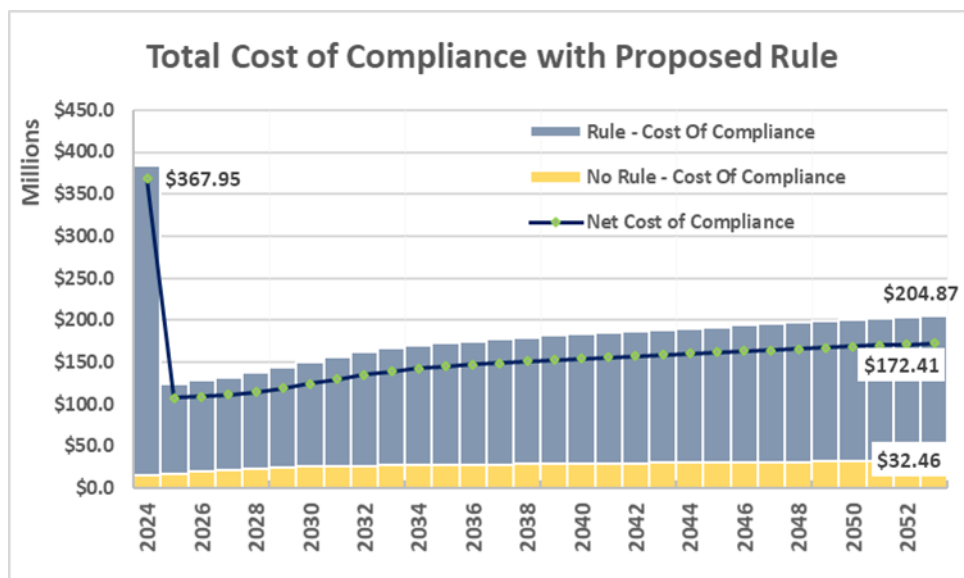
The proposed rule would impose the following costs: one-time conversion costs of redesigning existing portable generator models and modifying manufacturing operations for the development of portable generators with reduced emissions and with CO sensors/shutoff systems; increased variable costs of producing portable generators with reduced CO emission rates and CO sensors with shutoff capabilities; recurrent testing cost to validate compliance of each new model with the proposed standard; sensor replacement costs to consumers for the substitution of failed CO sensors or CO sensors that have reached end of life; and deadweight loss³⁴ caused by price increases resulting from increased manufacturing costs.

1. 30-Year Total Cost of the Proposed Rule

³⁴ Deadweight loss is the net loss to consumers and producers of the value generated from lost transactions that would have occurred in the absence of the new regulation.

Staff added up all cost categories to determine the total cost of the proposed rule over the 30-year study period, as show in Figure 4.

Figure 4: Total Costs over the 30-Year Study Period



Over the 30 years, the net cost of implementing the proposed rule add up to \$4.63 billion undiscounted, \$2.92 billion discounted at 3 percent, and \$1.78 billion discounted at 7 percent.

2. Annualized and Per Unit Cost of the Proposed Rule

This section converts the aggregate costs over the 30-year study period into annualized and per-unit outputs. An annualized output converts the aggregate costs over 30 years into a consistent annual amount while considering the time value of money. This metric is helpful when comparing the costs among different rules or policy alternatives that may have different timelines, or those that have similar timelines but costs for one are front-loaded while the other's maybe backloaded. A per-product metric expresses the costs from the rule in one unit of product. This metric is helpful when assessing the impact in marginal terms—for example, comparing costs to an increase in retail price.

Table 6 summarizes the net cost of the proposed rule in annualized terms under staff's assumptions:

Table 6. Annualized Cost of the Proposed Rule

Cost Categories	Annualized Cost (\$M)		
	Undiscounted	3% Discount	7% Discount
Manufacturing Cost	\$127.31	\$120.86	\$113.20
Model Redesign and Testing	\$6.39	\$10.33	\$16.27
CO Sensor Replacement	\$19.83	\$16.90	\$13.30
Deadweight Loss	\$0.90	\$0.85	\$0.80
Total Cost	\$154.43	\$148.94	\$143.56

Table 7 summarizes these net costs in per unit terms:

Table 7. Per Unit Cost of the Proposed Rule

Cost Per Product	Cost per Product (\$)		
	Undiscounted	3% Discount	7% Discount
Manufacturing Cost	\$50.83	\$31.53	\$18.69
Model Redesign and Testing	\$2.55	\$2.69	\$2.69
CO Sensor Replacement	\$7.92	\$4.41	\$2.20
Deadweight Loss	\$0.36	\$0.22	\$0.13
Total Cost	\$61.66	\$38.85	\$23.71

C. Preliminary Regulatory Analysis: Benefits Analysis

To estimate benefits from the proposed rule, staff estimated the number of injuries from casualties reported through the NEISS - a national probability sample of U.S. hospital emergency departments (ED) - and counted the number of deaths entered in the Consumer Product Safety Risk Management System (CPSRMS), a database of consumer incident reports. In addition to these two databases, staff used estimates generated by the CPSC's Injury Cost Model (ICM). See Section IV of this preamble and Tab A of Staff's SNPR Briefing Package for further description.

Staff then used death counts and the ICM national estimates of the number of injuries to forecast the number of expected deaths and injuries for a 30-year study period. To produce a forecast, staff assumed the incident rates by type of injury per million portable generators would remain at the same levels experienced during the period 2004 through 2021. Staff then used the

expected effectiveness of the proposed rule in preventing deaths and injuries to estimate the number of prevented fatalities and injuries, which were then monetized using the value of statistical life (VSL) for deaths and ICM cost estimates for injuries. Over 30 years, the Commission estimates the rule would prevent 2,148 deaths (nearly 72 deaths per year) and 126,377 injuries (roughly 4,213 injuries per year).

Staff then converted the aggregate benefits over the 30-year study period into annualized and per unit outputs. For detailed information on this analysis, see Tab B of Staff's SNPR Briefing Package.

Table 8 summarizes the benefits of the proposed rule in annualized terms.

Table 8. Annualized Benefits of the Proposed Rule

Prevented Casualties	Annualized Benefits (\$M)		
	Undiscounted	3% Discount	7% Discount
Deaths	\$977.85	\$848.90	\$695.08
Injuries	\$224.24	\$197.10	\$164.05
Total Benefits	\$1,202.09	\$1,046.00	\$859.13

Table 9 summarizes the cost of the proposed rule in per unit terms.

Table 9. Per Unit Benefits of the Proposed Rule

Prevented Casualties	Per Unit Benefits (\$)		
	Undiscounted	3% Discount	7% Discount
Deaths	\$390.39	\$221.43	\$114.78
Injuries	\$89.52	\$51.41	\$27.09
Total Benefits	\$479.92	\$272.84	\$141.88

Based on these estimates, the benefits of the rule outweigh the costs by a factor of 7.02, when discounted at 3 percent. Table 10 displays annualized metrics for both the benefits and costs of the proposed rule. The benefits of the proposed rule far exceed the estimated costs. The

Commission calculates net benefits, discounted at 3 percent, to be \$1.046 billion in benefits less \$148.94 million in costs, or \$897.06 million on an annualized basis.

Table 10. Annualized Net Benefits and B/C Ratio

Annualized Net Benefits (\$M)	Benefits Compared to Costs		
	Undiscounted	3% Discount	7% Discount
Benefits	\$1,202.09	\$1,046.00	\$859.13
Costs	\$154.43	\$148.94	\$143.56
Net Benefits (Benefits – Costs)	\$1,047.65	\$897.06	\$715.57
B/C Ratio	7.78	7.02	5.98

3. Sensitivity Analysis

Even in the absence of the rule, there are a number of portable generators for sale in the market that currently comply with PGMA G300, and a smaller number of generators that comply with UL 2201. Based on information provided by large U.S. manufacturers about their existing models and plans, which was then supported by an analysis of portable generators for sale online, CPSC staff estimated that the current level of compliance with the sensor and shutoff requirement (*i.e.*, PGMA G300) is at 30 percent, while compliance with both requirements (*i.e.*, UL 2201) is at 5 percent of total annual sales. The Commission assumes that in the absence of the proposed rule, those compliance rates would stay constant in future years.

Because voluntary compliance with either standard can potentially reduce the costs and benefits of the proposed rule, and because PGMA has suggested that staff's estimate of 30 percent compliance with PGMA G300 is too low, the Commission provides a sensitivity analysis to assess the significance of a higher level of compliance in the baseline scenario (*i.e.*, no proposed rule implemented) on the net benefits of the proposed rule. For this analysis, CPSC doubles the assumed level of compliance with PGMA G300 to 60 percent, while maintaining the level of compliance with UL 2201 at 5 percent.

Table 11 presents the annualized and per product benefits of the main analysis and the corresponding metrics for this sensitivity analysis. A higher compliance with the PGMA G300 voluntary standard reduces the annualized benefits from the proposed the rule from \$1,046 million to \$678.17 million and reduces the benefits per product from \$272.84 to \$176.72. Estimated benefits would still exceed estimated costs by a ratio of more than five to one.

Table 11: Sensitivity Analysis – Change in Annualized and Per Product Benefits of the Rule

Benefits - Costs (present values disc. at 3%)	Annualized Net Benefits (\$M)		Net Benefits per Product (\$)	
	Main Analysis	Sensitivity at 60 percent	Main Analysis	Sensitivity at 60 percent
Benefits	\$1,046.00	\$678.17	\$272.84	\$176.72
Costs	\$148.94	\$132.31	\$38.85	\$34.48
Net Benefits (Benefits – Costs)	\$897.06	\$545.86	\$233.99	\$142.24
B/C Ratio	7.02	5.13	7.02	5.13

Because there is significant uncertainty about the levels of current compliance with the sensor/shutoff and emission requirements in the voluntary standards, including PGMA’s recent assertion that over 68% of the PGMA member company generators comply with the CO shutoff requirement, the Commission has conducted additional sensitivity analyses to produce a more comprehensive assessment of the benefits and costs of the proposed rule. The levels of assumed compliance used for this purpose may either overstate or understate actual compliance with particular requirements of the standards, but they are useful to illustrate the direction of the benefit-cost analysis under these threshold situations.

With this objective in mind, Commission staff conducted a sensitivity analysis that increased compliance with the sensor/shutoff requirement (*i.e.*, PGMA G300) from the estimated 30 percent used in the main analysis to 80 percent, while maintaining compliance with the UL 2201 emissions requirement at 5 percent of total annual sales. As shown in Table 12, even with such high compliance rate with the sensor/shutoff requirement of the PGMA G300 in the baseline, the implementation of the rule generates annualized net benefits of \$311.4 million due to reduced deaths and injuries. The benefits are less than half the benefits in the main analysis,

and the cost of implementation are also lower. However, this modeled situation again produces benefits that significantly exceed the costs, with every \$1 in costs generating \$3.56 in benefits.

Table 12. Sensitivity Analysis at 80 Percent Compliance Rate with Sensor/Shutoff Requirement – Annualized and Per Product Benefits of the Rule

Benefits - Costs (present values disc. at 3%)	Annualized Net Benefits (\$M)		Net Benefits per Product (\$)	
	Main Analysis	Sensitivity at 80 percent	Main Analysis	Sensitivity at 80 percent
Benefits	\$1,046.00	\$432.95	\$272.84	\$112.75
Costs	\$148.94	\$121.55	\$38.85	\$31.65
Net Benefits (Benefits – Costs)	\$897.06	\$311.40	\$233.99	\$81.09
B/C Ratio	7.02	3.56	7.02	3.56

Commission staff also conducted a sensitivity analysis that changed compliance with the emissions requirement of UL 2201 from the estimated 5 percent used in the main analysis to 1 and 10 percent, while maintaining compliance with the sensor/shutoff requirement of PGMA G300 at 30 percent of total annual sales. Table 13 displays annualized benefits, costs, net benefits and benefit-cost ratios of the proposed rule under these assumptions. These compliance rates have small impacts on the annualized net benefits compared to the baseline, with a change of less than \$5 million in each case. Benefits still exceed costs by a factor of almost seven, with every \$1 in costs generating \$6.87 in benefits at the 1 percent compliance rate, and \$7.20 at the 10 percent compliance rate.

Table 13. Sensitivity Analysis at 1 and 10 Percent Compliance Rate with the Emissions Requirement – Annualized and Per Product Benefits of the Rule

Benefits - Costs (present values disc. at 3%)	Annualized Net Benefits (\$M)		Net Benefits per Product (\$)	
	Sensitivity at 1 percent	Sensitivity at 10 percent	Sensitivity at 1 percent	Sensitivity at 10 percent
Benefits	\$1,053.90	\$1,036.12	\$263.77	\$285.34
Costs	\$153.49	\$143.92	\$38.41	\$39.64
Net Benefits (Benefits – Costs)	\$900.42	\$892.20	\$225.36	\$245.70
B/C Ratio	6.87	7.20	6.87	7.20

4. Unquantified Benefits and Costs

The benefit-cost analyses above estimate the cost to consumers and producers pushed out of the market by calculating deadweight loss. However, Commission staff was unable to quantify the increased utility to consumers from having safer portable generators. This utility is derived from the sense of additional safety or reduction in anxiety when operating the product knowing that the hazard has been mitigated. This benefit is in addition to the reduced deaths and injuries quantified in this analysis and would indicate that the benefits estimated in this analysis are likely an underestimate of all benefits accrued to consumers. See Tab B of Staff’s SNPR Briefing Package for further discussion of the assessment of intangible benefits.

The Commission was also unable to quantify precisely the benefits of reducing injuries from the increased level of safety provided by the proposed rule’s CO emissions requirement with respect to the outdoor operation of G300-compliant portable generators.³⁵ Although the hazard pattern of injuries is largely unknown because of minimal narratives from NEISS records, the Commission believes it is reasonable to assume that at least some of the injuries—like some

³⁵ The shutoff systems required by PGMA G300 and UL 2201 are expected to perform well indoors. When the generator is operated outdoors, however, weather conditions, the direction of the generator exhaust, and other situational factors may lower the level of CO concentration near the generator and not activate the shutoff system. Because G300 does not require a CO emission rate reduction, a G300-compliant portable generator (that is not compliant with UL 2201) running outdoors that does not shut off presents the same risk of CO poisoning as a noncompliant generator.

of the reported deaths for which scenarios are known—were caused by portable generators operated outdoors.

The Commission assumed the effectiveness shown in the simulations could be extended to all incidents; however, of the 511 deaths replicated in the simulations, less than 2 percent (8 deaths) replicated the scenario of the generator operating outdoors the entire time, whereas CPSC’s fatality data shows that 6 percent of the deaths were reported to have occurred with the generator operating outdoors (79 out of 1332 deaths, as of May 10, 2022). Thus, the outdoor scenario is underrepresented in the injury estimates. Taking into consideration the diminished CO concentrations around the portable generator when it is operated outside, the Commission believes the effectiveness rate of G300-compliant generators in reducing injuries may be overstated, and the benefits of implementing the emission requirements of UL 2201 are consequently understated. The Commission requests information regarding CO exposures, CO injuries, and CO alarm activations that have occurred from portable generators operating outdoors as well as indoors.

Depending on the emission control strategy that manufacturers use to meet the CO emission rate performance requirement in the proposed rule, it is possible product modifications made to comply with the proposed rule could improve portable generators’ fuel-efficiency, as well as other characteristics such as ease of starting, altitude compensation, fuel adaptability, power output, reliability, and engine life. The Commission did not quantify the secondary benefits associated with these features, but if these incremental benefits were realized, they would improve the overall benefit-cost ratio of the proposed rule.

Regarding costs, an underlying assumption in this assessment is that there would be no behavioral adaptation in response to the reduced rate of CO emissions from portable generators under the proposed rule. However, consumers’ perceptions of injury likelihood and health impacts may be affected by the reduced CO emissions and shutoff features under the rule, which

may give consumers a greater sense of security from CO hazards. This, in turn, could result in less careful behavior.

In addition, the portable generators within the scope of this proposed rule are commonly used by consumers to provide electrical power during power outages caused by storms, and at other times when power has been shut off to a home. In a small number of instances, CO sensor failures that cause shutoff pursuant to the Commission's rule, that would not have occurred absent the rule, may disrupt these critical uses of portable generators and produce disutility costs that are not reflected in the costs estimated above. We seek comment on this possibility.

D. Evaluation of Voluntary Standards

The Commission finds that while the existing voluntary standards are not adequate to address the CO hazard for portable generators, requirements in the UL 2201 and PGMA G300 voluntary standards are effective when paired with the additional requirements in the proposed rule. In particular, under simulated conditions, the sensor/shutoff and emission requirements in UL 2201 would have averted essentially all of the deaths related to portable generators. Consequently, high levels of compliance with these requirements would greatly reduce deaths associated with consumers' use of portable generators. However, to achieve the simulated level of efficacy in real-life situations, there are a number of environmental factors and other considerations that must be addressed. These considerations create the need for additional requirements, which in some cases can be found in the PGMA G300 standard. Some of these requirements relate to the shutoff system's construction, ability to self-monitor, and tamper resistance. There are also requirements related to the inclusion of a CO shutoff notification system and labeling (to make the consumer aware of the reason for the shutoff), as well as requirements related to the inclusion of a notification marking the direction of the engine exhaust and instructions to direct the exhaust away from the occupied structures (to ensure safe operation outdoors), among others. Without these additional requirements, the real-world effectiveness of the standard is unlikely to approach the simulated level of efficacy. For these reasons, the

proposed rule does not implement UL 2201 as the mandatory standard, but instead takes key requirements from both standards and adds additional requirements needed to reduce the risk of CO poisoning from operation of portable generators by consumers.

Even if UL 2201 included all the requirements discussed in the previous paragraph, the need for a mandatory standard arises also as a result of a low level of manufacturer compliance with either voluntary standard, and the UL standard in particular. Staff reviewed portable generator models available for sale and found that non-compliant generators are prevalent. The large majority of models produced by smaller manufacturers abroad are non-compliant with either standard. Staff also conducted surveys of large U.S. manufacturers and found that compliance with UL 2201 is minimal, with most manufacturers lacking a clear path for implementation or even plans to become compliant with UL 2201. See Tab B of Staff's SNPR Briefing Package.

E. Alternatives to the Proposed Rule

The Commission considered five alternatives to the proposed rule: (1) implement the proposed rule without the emission requirements included in UL 2201 and using the CO concentration limits required for shutoff that are found in PGMA G300-2018; (2) rely on the voluntary standard organizations' adoption of the requirements of the proposed rule into one of the voluntary standards; (3) issue a rule that relies on either UL 2201 2nd Edition or PGMA G300-2018 as they are currently written; (4) continue to conduct education and information campaigns regarding the CO hazard from portable generators, and (5) take no action. Each alternative is discussed below.

1. Implement the Proposed Rule Without the Emission Requirements and CO Concentrations for Shutoff from UL 2201

An alternative to the proposed rule is to require portable generator manufacturers to comply with the PGMA G300-2018 voluntary standard with only the modifications required to ensure durability, reliability, and safe operation of the sensor/shutoff system. The Commission

considered this alternative because it provides some reduction of risk of acute CO poisoning from portable generators in enclosed spaces, and also because implementation costs are likely lower, while current compliance with the voluntary sensor/shutoff requirement is higher (compared to compliance with the UL standard's emission requirement). The Commission preliminarily rejects this alternative because it would result in 372 more deaths and 11,135 more injuries over 30 years compared to the proposed rule, and the net benefits of the proposed rule are higher than the benefits of this alternative. Tab B of Staff's SNPR Briefing Package provides a more in-depth analysis of this alternative.

2. Await Possible Adoption of the Proposed Rule Requirements into UL 2201 or PGMA G300

Alternative 2 proposes reliance on voluntary standard stakeholders to adopt all the requirements included in the proposed rule into either the UL 2201 or the PGMA G300 voluntary standard. The Commission is not proposing to adopt this alternative because obtaining consensus on a voluntary standard that has all the requirements of the proposed rule is unlikely, and staff assesses that current compliance with either voluntary standard is low. Therefore, it is reasonable to assume that even if a voluntary standard with all of the proposed rule's requirements were to achieve consensus, it would not be substantially complied with by manufacturers.

3. Issue a Rule that Relies on Either UL 2201 2nd Edition or PGMA G300-2018 as Currently Written

This alternative to the proposed rule would require portable generators to comply with either the UL 2201 (2nd Edition; 2018) or PMGA G300-2018. The Commission is not proposing this alternative because, as explained earlier, neither standard is adequate. The Commission assesses that the shutoff requirements in PGMA G300 would leave 69 of the 511 fatalities in the staff/NIST simulation unaddressed. In addition, other requirements of PGMA

G300 are not adequate such as those for tamper resistance, verifying compliance with the shutoff requirements, and notification and labeling requirements.

The Commission assesses that the CO emission rate and shutoff performance requirements from UL 2201 are extremely effective in reducing the risk injury or death associated with CO poisoning from portable generators. This standard, however, lacks the requirements necessary to ensure the durability, reliability, and functionality of the CO shutoff system and notification and labeling requirements.

4. Not Issue a Rule and Continue to Conduct Information and Education Campaigns

The Commission considered the merits of continuing to conduct education and information campaigns without a rule, as an alternative to the proposed rule. Existing CPSC education and information campaigns on the hazards associated with CO, and continued CPSC advocacy on smoke and CO alarm adoption, could potentially avoid some deaths associated with portable generators. The Commission supports and acknowledges the importance of such efforts; however, these efforts have not resulted in a decrease in the number of annual generator-related CO deaths, and in fact, deaths have increased in recent years.

5. Take No Action

Finally, the Commission considered the merits of taking no action. An assessment of the trends in deaths and injuries and the low adoption of the voluntary standards, indicate this problem will not correct itself. Over the next 30 years at current levels of compliance with the voluntary standards, deaths are expected to exceed 2,600 with roughly 154,000 injuries, and a total societal cost in excess of \$27 billion (discounted at 3 percent). See Tab B of Staff's SNPR Briefing Package. For these reasons, the Commission is not adopting this alternative.

VIII. Initial Regulatory Flexibility Analysis

Whenever an agency publishes an NPR, Section 603 of the Regulatory Flexibility Act (RFA), 5 U.S.C. 601–612, requires agencies to prepare an initial regulatory flexibility analysis (IRFA), unless the head of the agency certifies that the rule will not have a significant economic

impact on a substantial number of small entities. The IRFA, or a summary of it, must be published in the *Federal Register* with the proposed rule. Under Section 603(b) of the RFA, each IRFA must include:

- (1) a description of why action by the agency is being considered;
- (2) a succinct statement of the objectives of, and legal basis for, the proposed rule;
- (3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
- (4) a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and
- (5) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule.

The IRFA must also describe any significant alternatives to the proposed rule that would accomplish the stated objectives and that minimize any significant economic impact on small entities. Staff's initial regulatory flexibility analysis is provided in Tab C of Staff's SNPR Briefing Package.

A. Reason for Agency Action

The purpose of this rulemaking is to reduce the risk of death or injury from acute CO poisoning resulting from consumer use of portable generators. There were at least 1,332 deaths involving portable generators from 2004 through 2021 as of May 10, 2022 (see Section IV. of this preamble), or an average of about 74 annually. From 2004 through 2021, there were a total of 17,569 nonfatal CO poisonings involving portable generators that were treated in hospital emergency departments (about 976 annually); 7,308 hospital admissions (an average of 406 per year); and 52,782 medically attended injuries treated in other settings (an estimated 2,932 per year). The Commission is promulgating the proposed rule to reduce these generator-related CO

injuries and deaths and the associated societal costs. Although there are two voluntary standards that address CO poisoning from portable generators, the Commission assesses that there is not substantial compliance with these voluntary standards throughout the industry, nor would adoption of either of these standards reduce the hazard risk as effectively as the proposed rule.

B. Objectives and Legal Basis for the Rule

The Commission proposes this rule to reduce deaths and injuries resulting from acute exposure to CO associated with portable electric generators. The Commission published an advance notice of proposed rulemaking in December 2006, which initiated this proceeding to evaluate regulatory options and potentially develop a mandatory standard to address the risks of acute CO poisoning associated with the use of portable generators. In 2016, the Commission published a notice of proposed rulemaking (NPR) that proposed CO emission rate requirements for portable generators based on four different categories of engine sizes. PGMA and UL published revisions to their voluntary standards in 2018. The Commission has assessed the effectiveness of the CO-mitigation provisions in the voluntary standards and preliminarily concludes that neither standard is adequate to address the unreasonable risk of injury associated with portable generators. Additionally, Commission data indicate that compliance with PGMA G300 and UL 2201 has not increased substantially since the publication of their 2018 revisions while the number of deaths and injuries has continued to increase. See Tab B of Staff's SNPR Briefing Package. The Commission concludes a mandatory standard is required to reduce the significant hazards associated with this consumer product. The proposed rule is being issued under the authority of sections 7 and 9 of the CPSA.

C. Small Entities to Which the Rule Will Apply

The proposed rule would apply to all entities that manufacture or import portable generators that are powered by spark-ignited engines. Based on data collected by Power Systems Research, along with other market research, staff identified 110 manufacturers of generators that have at some time supplied portable generators to the U.S. market. Most of these manufacturers

were based in other countries. Staff identified 13 domestic manufacturers of gasoline, natural gas, and LPG-powered portable generators, four of which would be considered small based on the Small Business Administration size guidelines. Three of the four small manufacturers are primarily engaged in the manufacture or supply of larger, commercial, industrial, or backup generators, or other products, such as electric motors, that are not subject to the proposed rule. For the one remaining small manufacturer, portable generators likely account for a significant portion of that firm's total sales.

Using the same sources of data described above, staff identified more than 90 firms that have produced or imported gasoline and LPG-powered portable generators. However, in most cases, these firms have not imported portable generators regularly, or portable generators account for an insignificant portion of their sales. Of these 90 firms, staff assessed that 20 may be small importers of gasoline and propane-powered portable generators that could be affected by the proposed rule.

D. Compliance, Reporting, and Record-Keeping Requirements of Proposed Rule

The CPSA requires manufacturers (the term includes importers) to certify that their products comply with applicable CPSC standards and regulations. 15 U.S.C. 2063(a)(1). If the Commission should finalize a portable generator rule, manufacturers, including importers, would need to certify that the product conforms to the standard. For products that manufacturers certify, manufacturers would issue a general certificate of conformity (GCC). The requirements for the GCC are stated in Section 14 of the CPSA and discussed in Tab C of Staff's SNPR Briefing Package.

E. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rule

CPSC has not identified any other Federal rules involving the risk of acute CO poisoning from portable generators that duplicate, overlap, or conflict with the proposed rule.

F. Potential Impact on Small Entities

1. Impact on Small Manufacturers

To comply with the proposed rule, small manufacturers would incur the costs to redesign, test, and manufacture compliant generators. As discussed in the preliminary regulatory analysis (Section VII of this preamble), the undiscounted cost of redesigning, testing, and manufacturing associated with the proposed rule is expected to be, on average, about \$53.38 per portable generator upgraded because of the proposed rule, or \$34.22 discounted at 3 percent. The retail prices staff observed for portable generators from manufacturers and importers of all sizes ranged from a low of \$149 to \$6,649, depending upon the characteristics of the generator. The estimated average increase of \$34.22 in discounted costs represents roughly 3 percent of the average retail price of a portable generator.

Generally, impacts that exceed one percent of a firm's revenue are considered to be potentially significant. Depending on the size of the generator, the average discounted cost of the upgrade would be between 0.5 percent and 23 percent of the retail prices (or average revenue) of generators; therefore, the proposed rule could have a significant impact on manufacturers and importers that receive a significant portion of their revenue from the sale of the lowest priced portable generators.

2. Impact on Small Importers

For small importers, the impact of the proposed rule would be similar to small manufacturers. In some cases, the foreign suppliers could opt to withdraw from the U.S. market rather than incur the costs of redesigning their generators to comply with the proposed rule. If this occurs, the domestic importers will have to find other suppliers of portable generators or exit the portable generator market. Exiting the portable generator market could be considered a significant impact if portable generators accounted for a significant percentage of the firm's revenue. However, at least three of these firms focus on mobile generators, which are not the same as portable and are generally larger products that are trucked to a site in need of electricity for industrial or business requirements.

Small importers will be responsible for issuing a GCC certifying that their portable generators comply with the proposed rule should it becomes final. However, importers may rely upon testing performed and GCCs issued by their suppliers in complying with this requirement.

3. Alternatives Considered to Reduce the Burden on Small Entities

Under section 603(c) of the Regulatory Flexibility Act, 5 U.S.C. 603(c), an initial regulatory flexibility analysis should “contain a description of any significant alternatives to the proposed rule which accomplish the stated objectives of the applicable statutes and which minimize any significant impact of the proposed rule on small entities.” The Commission examined several alternatives to the proposed rule which could reduce the impact on small entities. These alternatives, along with the reasons the Commission is not adopting them, are discussed in section VII.G of this preamble.

IX. Response to Comments

Based on changes to the proposed requirements in the SNPR compared to those initially proposed in the NPR, many of the comments to the 2016 NPR are no longer pertinent. Many other comments have been addressed since the NPR through staff’s simulation plan and effectiveness analysis of the CO mitigation requirements in the voluntary standards. Following is a summary of and response to significant comments received following publication of the 2016 NPR.

Different emission rates based on engine size.

(Comment 1) Four commenters (PGMA, Briggs & Stratton, Champion Power Equipment, and Generac) objected to the 2016 NPR’s proposal of four different levels of maximum CO emissions, depending on the size of engine. Commenters claimed that the tiered emission levels were based on achievable rates using best available technology rather than evidence regarding the safety of the levels. These commenters claimed that the impact on consumer safety or the reduction of CO injuries was not clearly presented for each of these tiered levels.

(Response 1) The proposed requirements detailed in this SNPR do not require different rates for different engine sizes. The requirements of the current proposed rule, which are applicable to generators of all engine sizes, are expected to eliminate nearly all deaths and most injuries.

Mandatory label for portable generators has accomplished what is necessary.

(Comment 2) PGMA and Briggs & Stratton claimed that, since the introduction of CPSC’s 2007 mandatory portable generator safety label, 16 CFR part 1407, the rate of unintentional CO fatalities associated with portable generators had decreased.

(Response 2) Staff disagrees. The effective date of CPSC’s mandatory label was February 2007, which was more than 15 years ago. As the data in Figure 1 of this preamble show, there has been no obvious and consistent reduction in CO fatalities since that time, and CO fatalities associated with portable generators have been increasing in recent years. While data collection for 2020 is ongoing, the number of CO deaths caused by portable generators in 2020 is likely to exceed the highest number of annual deaths over the reporting period of 2004 to 2021, which occurred in 2005 (103 deaths), prior to the mandatory label.

Authority to regulate.

(Comment 3) Four commenters (PGMA, Briggs & Stratton, Generac, and the Truck and Engine Manufacturers Association) stated that pursuant to section 31 of the CPSA, the CPSC lacks the authority to regulate the risk of injury associated with CO emissions from portable generators because that risk could be addressed by EPA under the Clean Air Act (CAA), 42 U.S.C. 7401 *et seq.*

(Response 3) Section 31 provides that the CPSC lacks authority to regulate a consumer product if that risk “could be eliminated or reduced to a sufficient extent through actions” taken under the CAA or other listed statutes. 15 U.S.C. 2080(a). The legislative history reveals that Congress contemplated a stricter ban on CPSC’s jurisdiction but rejected it. The Senate version of the language that became section 31 would have precluded CPSC’s jurisdiction if the product was “subject to safety regulation,” defined as “authorized to be regulated for the purpose of

eliminating any unreasonable risk of injury or death,” under any of the statutes listed.³⁶ The House version of the bill, which was eventually enacted, instead gave the Commission the authority to regulate if the risk of injury cannot be reduced to a sufficient extent under one of the enumerated Acts.³⁷ The Conference Report explains:

In determining whether a risk of injury can be reduced to a sufficient extent under one of the Acts referred to in this section, it is anticipated that the Commission will consider all aspects of the risk, together with the remedial powers available, to it under both the bill and the remedial powers under the other law available to the agency administering the law.

Id.

Case law confirms that section 31 does not restrict CPSC from regulating simply because another agency has acted or could act in the same area. In *ASG Industries, Inc. v. CPSC*, 593 F.2d 1323 (D.C. Cir. 1979), the D.C. Circuit rejected the argument that the Commission lacked authority to regulate architectural glazing materials used in most non-residential buildings because it could be regulated under the Occupational Safety and Health Act (OSHA), which is a statute listed in section 31. The court concluded “that CPSA § 31 was not intended to preclude the exercise of jurisdiction by CPSC whenever a product-hazard either potentially could be or was in part being regulated under OSHA. Congress required CPSC to make a judgement.” 593 F.2d at 1328-29.

Section 213(a)(1) of the CAA directs the EPA to conduct a study of emissions from nonroad engines to determine if they cause or contribute to air pollution, “which may reasonably be anticipated to endanger public health or welfare.” Within 12 months of completion of the study, section 213 directs the EPA to make a determination on whether CO emissions from nonroad engines are “significant contributors to ozone or carbon monoxide concentrations in

³⁶ S. Rep. No. 92-749, 92d Cong., 2d Sess. 12-13 (1972).

³⁷ H.R. Rep. No. 92-1593, 92d Cong., 2d Sess. 38 (1972).

more than 1 area which has failed to attain the national ambient air quality standards for ozone or carbon monoxide.” 42 U.S.C. 7547(a)(2).

The statutory authority for EPA to address CO emissions thus is tied to a determination that the emissions are contributing to air pollution. The CPSC does not seek to address the effects of CO emission on ambient air pollution, but instead, the acute CO poisoning hazard to consumers associated with use of portable generators in which nonroad spark engines are installed.

EPA’s large-scale focus on carbon monoxide emissions is not directed to the protection of individual consumers from carbon monoxide poisoning. The risk of CO poisoning from portable generators has persisted, and deaths and injuries associated with CO emissions from portable generators have increased, even with EPA’s adoption of regulations to limit CO emissions from nonroad spark engines to address air pollution and ambient air quality. This rulemaking is intended to address this acute risk to consumers of CO poisoning from portable generators and is within CPSC’s regulatory authority.

Include compression units within the scope of the rule.

(Comment 4) PGMA stated that any proposed requirement should be applicable to all portable generators, not just spark-ignited units. PGMA pointed out that compression units, as well are within the scope of the PGMA G300 voluntary standard.

(Response 4) The Commission disagrees. Compression ignition engines³⁸ (*i.e.*, diesel engines) emit significantly less CO compared to spark ignited engines. CPSC staff has not identified any fatality as involving emissions from a diesel generator. Furthermore, diesel generators are primarily used by individuals in a work-related setting or environment, and typically are not consumer products. Thus, the Commission is not including diesel generators in the scope of the proposed rule.

³⁸ Compression ignition engines use a higher compression ratio than a spark to heat air in the engine cylinder, and thus do not use a spark plug to ignite the air-fuel mixture.

CO shutoff system.

(Comment 5) Four commenters (PGMA, Briggs & Stratton, Generac, and Champion) stated that the 2016 NPR did not adequately consider the potential for using generator shutoff concepts.

The commenters asserted that the CO shutoff solution was a more feasible and reliable solution to that proposed in the 2016 NPR.

(Response 5) The revised proposed rule includes requirements for a CO shutoff system.

Modeling of generators running outdoors.

(Comment 6) PGMA and Briggs & Stratton stated that CPSC needs to conduct modeling of generators running outdoors.

(Response 6) The analyses of the PGMA G300 and UL 2201 voluntary standards that support this SNPR include results from testing and modeling of generators running outdoors.

Closed loop electronic fuel injection system (EFI) and catalyst.

(Comment 7) Four commenters (PGMA, Generac, Briggs & Stratton, and the Truck and Engine Manufacturers Association) stated that the NPR proposed to reduce CO emission rates using closed loop electronic fuel ignition (EFI) and 3-way catalysts, and that these technologies can be detrimental to a catalyst-equipped air-cooled engine's durability, performance, and emissions maintenance. PGMA has also alleged that the elevated exhaust temperatures from these technologies could lead to burn and fire hazards.

(Response 7) The 2016 NPR did not prescribe emissions control technologies. As discussed in more detail in Staff's SNPR Briefing Package, staff has observed portable generator models currently in the marketplace that are certified to UL 2201 and/or appear to meet the CO emission rate of the proposed rule, using various technologies as well as techniques to address additional heat.

Elimination of LPG and dual fuel generators from the market.

(Comment 8) In response to the requirements in the 2016 NPR, Champion and Generac stated that if EFI is the primary technical solution adopted to achieve compliance, then the standard

would eliminate conventional and dual fuel generators from the market. The commenters stated that LPG and dual fuel generators represent a significant portion of portable generator sales.

(Response 8) The proposed rule does not prescribe how manufacturers must meet the CO emission rate requirement. Manufacturers are using different emission control strategies to lower the CO emission rate to levels the Commission expects will meet the CO emission rate requirement in the proposed rule. Furthermore, due to propane's chemical composition, it produces less CO compared to gasoline, thereby making it less challenging for an LPG generator to meet the proposed rule than a gasoline generator of equivalent rated wattage.

False sense of security.

(Comment 9) Four commenters (PGMA, Briggs & Stratton, Champion, and Generac) claimed that consumers may mistakenly believe that reduced CO emissions means it is safe to operate a portable generator indoors.

(Response 9) The revised proposed rule does not rely on reduced emissions alone. The proposed rule's addition of a shutoff requirement, similar to that supported by PGMA in response to the 2016 NPR, further reduces the risk of death and injury from these products.

PGMA G300

(Comment 10) Three commenters (PGMA, Generac, Briggs & Stratton) asserted that the then-proposed revisions to PGMA G300 (now part of PGMA G300-2018), would address nearly all fatalities resulting from misuse of portable generators in enclosed spaces.

(Response 10) The Commission disagrees. The effectiveness analysis that replicated 511 generator-related CO deaths in CPSC's databases found that if the generators complied with PGMA G300, there still would have been 69 deaths. Moreover, of the 442 survivors from the 511 simulations assuming G300 compliance, 142 would have been injured such that 54 would have been hospitalized and 88 would have been treated and released.

Additionally, staff's testing of commercially available generators compliant with PGMA G300 and UL 2201, documented in NIST Technical Note 2200,³⁹ show that two generators that were PGMA G300-compliant, when run in an attached garage with the bay door fully open, did not result in localized CO levels sufficient to activate the CO shutoff system, yet resulted in CO concentrations in the living space of the house that would have caused injuries to the home's occupants. In one test, the generator ran out of fuel after 329 minutes, resulting in COHb values for theoretical occupants in the house that peaked in the range of 27 percent to 37 percent. This is in the range of where symptoms such as severe headache, nausea, vomiting, and cognitive impairment are expected to occur. In the other test, the generator ran for 468 minutes before the test operator manually shut the generator off because of time constraints and stopped data collection. The COHb values for theoretical occupants at the time the generator was stopped ranged from 20 percent to 26 percent, which is in the range of where symptoms such as throbbing headache and mild nausea are expected to occur. Furthermore, PGMA G300 does not address deaths and injuries from generators used outdoors, where local CO concentrations are less likely to build to a sufficient level to activate the CO shutoff system, as evidenced by a 3-fatality incident involving a PGMA G300 generator used outside and near a home. See Tab G of Staff's SNPR Briefing Package.

X. Incorporation by Reference

The Commission proposes to incorporate by reference UL 2201, *Standard for Safety, Carbon Monoxide (CO) Emission Rate of Portable Generators, Second Edition*, and ANSI/PGMA G300-2018 (Errata Update), *Safety and Performance of Portable Generators*. The Office of the Federal Register (OFR) has regulations regarding incorporation by reference. 1 CFR part 51. Under these regulations, agencies must discuss, in the preamble, ways in which the

³⁹ NIST TN 2200 *Carbon Monoxide Concentrations and Carboxyhemoglobin Profiles from Commercially Available Portable Generators Equipped with a CO Hazard Mitigation System*, available online <https://doi.org/10.6028/NIST.TN.2200>

material the agency incorporates by reference is reasonably available to interested parties, and how interested parties can obtain the material. In addition, the preamble must summarize the material. 16 CFR 51.5(b).

In accordance with the OFR regulations, section V of this preamble summarizes the major provisions of UL 2201 and PGMA G300 that the Commission proposes to incorporate by reference into 16 CFR part 1281. The standards are reasonably available to interested parties. Interested parties can schedule an appointment to inspect a copy of the standard at CPSC's Office of the Secretary, U.S. Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD 20814, telephone: (301) 504-7479; e-mail: cpsc-os@cpsc.gov. In addition, UL 2201 is available for free digital view at www.shopulstandards.com/ProductDetail.aspx?productId=UL2201_2_S_20180109. Interested parties can purchase a copy of UL 2201 from www.shopulstandards.com. PGMA G300 is available for free download at www.pgmaonline.com/publications.asp.

XI. Environmental Considerations

Generally, the Commission's regulations are considered to have little or no potential for affecting the human environment, and environmental assessments and impact statements are not usually required. See 16 CFR § 1021.5(a). The proposed rule is not expected to have an adverse impact on the environment and is considered to fall within the "categorical exclusion" for the purposes of the National Environmental Policy Act. 16 CFR § 1021.5(c).

XII. Preemption

Executive Order (EO) 12988, Civil Justice Reform (Feb. 5, 1996), directs agencies to specify the preemptive effect of a rule in the regulation. 61 FR 4729 (Feb. 7, 1996). The proposed regulation for portable generators is issued under authority of the CPSA. 15 U.S.C. 2051-2089. Section 26 of the CPSA provides that "whenever a consumer product safety standard under this Act is in effect and applies to a risk of injury associated with a consumer product, no State or political subdivision of a State shall have any authority either to establish or

to continue in effect any provision of a safety standard or regulation which prescribes any requirements as to the performance, composition, contents, design, finish, construction, packaging or labeling of such product which are designed to deal with the same risk of injury associated with such consumer product, unless such requirements are identical to the requirements of the Federal Standard.” *Id.* 2075(a). Thus, the proposed rule for portable generators, if finalized, would preempt non-identical state or local requirements for portable generators designed to protect against the same risk of injury.

States or political subdivisions of a state may apply for an exemption from preemption regarding a consumer product safety standard, and the Commission may issue a rule granting the exemption if it finds that the state or local standard: (1) provides a significantly higher degree of protection from the risk of injury or illness than the CPSA standard, and (2) does not unduly burden interstate commerce. *Id.* 2075(c).

XIII. Paperwork Reduction Act

This proposed rule contains information collection requirements that are subject to public comment and review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (PRA). 44 U.S.C. 3501–3520. We describe the provisions in this section of the document with an estimate of the annual reporting burden. Our estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing each collection of information.

CPSC particularly invites comments on: (1) whether the collection of information is necessary for the proper performance of the CPSC’s functions, including whether the information will have practical utility; (2) the accuracy of the CPSC’s estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; (3) ways to enhance the quality, utility, and clarity of the information to be collected; (4) ways to reduce the burden of the collection of information on respondents, including the use of automated collection techniques, when appropriate, and other forms of

information technology; and (5) estimated burden hours associated with label modification, including any alternative estimates.

Title: *Safety Standard for Portable Generators*

Description: The proposed rule would require each portable generator to comply with the labeling requirements in PGMA G300, *Safety and Performance of Portable Generators*, with modifications. Sections 7.2 of PGMA G300 contains requirements for labels, warnings and instructional literature.

Description of Respondents: Persons who manufacture or import portable generators.

Staff estimates the burden of this collection of information as follows in Table 14:

Table 14. Estimated Annual Reporting Burden

Burden Type	Number of Respondents	Frequency of Responses	Total Annual Responses	Hours per Response	Total Burden Hours	Annual Cost
Labeling	110	12		1	1,320	\$39,930.00
Testing	110	12		4	5,280	\$384,964.80
Total Burden					6,600	\$424,894.80

Our estimate is based on the following. There are 110 known entities supplying portable generators to the U.S. market. On average, each entity supplies 12 portable generator models to the market. All 110 entities are assumed to already use labels on both their products and packaging. However, all of the entities will need to make modifications to their existing labels to comply with the proposed rule. The estimated time required to make these modifications to the labeling is about 1 hour per model. Each entity supplies an average of 12 different portable generator models. Therefore, the estimated burden associated with labels is 1,320 hours (110 entities × 12 models per entity × 1 hour per model = 1,320 hours). We estimate the hourly compensation for the time required to create and update labels is \$30.25 (U.S. Bureau of Labor

Statistics, “Employer Costs for Employee Compensation,” March 2022, total compensation for all sales and office workers in goods-producing private industries: www.bls.gov/ncs/.)

Therefore, the estimated annual cost to industry associated with the labeling requirements is \$39,930 ($\$30.25 \text{ per hour} \times 1,320 \text{ hours}$). There are no operating, maintenance, or capital costs associated with the collection.

The proposed rule would also require that manufacturers certify that their products conform to the rule and issue a GCC. There are 110 known entities supplying portable generators to the U.S. market. On average, each entity supplies 12 portable generators to the market. Issuing a GCC would be new for all 110 manufacturers. The estimated time required to test the product and issue a GCC is about 4 hours per model. Each entity supplies an average of 12 different portable generator models. Therefore, the estimated burden associated with testing and issuance of a GCC is 5,280 hours ($110 \text{ entities} \times 12 \text{ models per entity} \times 4 \text{ hours per model} = 5,280 \text{ hours}$). We estimate the hourly compensation for the time required to test and issue GCCs is \$72.91 (U.S. Bureau of Labor Statistics, “Employer Costs for Employee Compensation,” March 2022, total compensation for all sales and office workers in goods-producing private industries: www.bls.gov/ncs/.) Therefore, the estimated annual cost to industry associated with testing and issuance of a GCC is \$384,964.80 ($\$72.91 \text{ per hour} \times 5,280 \text{ hours}$). There are no operating, maintenance, or capital costs associated with the collection.

Based on this analysis, the proposed standard for portable generators would impose a burden to industry of 6,600 hours, at an estimated cost of \$424,894.80 annually ($\$39,930.00 + \$384,964.80$). Existing portable generator entities would incur these costs in the first year following the proposed rule’s effective date. In subsequent years, costs could be less, depending on the number of new portable generator models introduced by existing entities and/or by entities entering the portable generator market. As required under the PRA (44 U.S.C. 3507(d)), CPSC has submitted the information collection requirements of this proposed rule to the OMB for review. Interested persons are requested to submit comments regarding information collection by

[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], to the Office of Information and Regulatory Affairs, OMB as described under the **ADDRESSES** section of this notice.

XIV. Certification

Section 14(a) of the CPSA requires that products subject to a consumer product safety rule under the CPSA, or to a similar rule, ban, standard or regulation under any other act enforced by the Commission, must be certified as complying with all applicable CPSC-enforced requirements. 15 U.S.C. 2063(a). A final rule would subject portable generators to this requirement.

XV. Effective Date

The Administrative Procedure Act (APA) generally requires that the effective date of a rule be at least 30 days after publication of a final rule. 5 U.S.C. 553(d). Section 9(g)(1) of the CPSA states that a consumer product safety rule shall specify the date such rule is to take effect, and that the effective date must be at least 30 days after promulgation but cannot exceed 180 days from the date a rule is promulgated, unless the Commission finds, for good cause shown, that a later effective date is in the public interest and publishes its reasons for such finding.

For this proposed rule, the Commission is proposing an effective date of 180 days after publication of the final rule in the *Federal Register*, and the rule would apply to portable generators manufactured after the effective date. The 2016 NPR proposed an effective date 1 year after publication of the final rule for larger generators and 3 years for smaller generators, to allow enough time to comply. However, significant changes have occurred since the NPR. The Commission assesses that a 1-year effective date for larger generators, and 3-year effective date for smaller generators, is no longer necessary.

Since the NPR, industry has published voluntary standards and some manufacturers have adopted them, which demonstrate their feasibility. In 2018, UL published UL 2201, which has a

requirement of a maximum weighted CO emission rate of 150 g/h for all portable generators.⁴⁰

At least one portable generator manufacturer currently certifies products to both UL 2201 and PGMA G300. Two other manufacturers each have one model in the marketplace that are certified to PGMA G300; and although not certified to UL 2201, CPSC staff expects these models would meet the proposed rule's CO emission rate requirement. One is a popular model of a brand-name gasoline generator that has been converted to run on propane, and the other is a recently introduced gasoline generator.

Notwithstanding these models currently on the market, the Commission assesses that most manufacturers will likely need time to develop, test, and plan for production of portable generators that would meet the proposed requirements, particularly the CO emission rate requirement. While the technology that the proposed rule would require is based on existing technology and the requirements are based on those in the existing voluntary standards, portable generators will need to be altered to be compliant. Therefore, the Commission is proposing 180 days, the maximum time allowed under CPSA section 9 absent a special showing of good cause, and seeks public comment on this time frame.

XVI. Request for Comments

We invite all interested persons to submit comments on any aspect of the proposed rule. Specifically, the Commission seeks comments on the following:

- Information regarding CO exposures, CO injuries, and CO alarm activations that have occurred from portable generators operating outdoors as well as indoors;
- The appropriateness of both the base period and the production limits included in the stockpiling provision. This would include evidence of variation in monthly portable generator manufacturing volumes, including whether any portable generator

⁴⁰ *UL 2201, Standard for Safety for Carbon Monoxide (CO) Emission Rate of Portable Generators, Second Edition*, Dated January 9, 2018.

manufacturers vary their production seasonally, information regarding the growth rate and variability of production and sales, and any other useful information;

- Information regarding any potential costs or benefits of the proposed rule that were not included in the foregoing preliminary regulatory analysis;
- Information regarding the number of small businesses impacted by the proposed rule and the magnitude of the impacts of the proposed rule;
- Information regarding potential differential impacts of the proposed rule on small manufacturers or suppliers that compete in different segments of the portable generator market;
- Whether any manufacturing costs that might disproportionately impact small businesses were not considered in this analysis;
- Whether the potential for CO sensor failures during usage in emergency situations that cause shutoff, that would not have occurred absent the rule, should be considered as a reduction in consumer welfare;
- Information regarding the necessity of a minimum luminance requirement for the indication associated with the notification for the portable generator system for controlling CO exposure, and what an appropriate luminance requirement might be;
- Information regarding CPSC's jurisdiction to regulate the acute CO poisoning hazard from portable generators, including information from interested agencies;

- Information regarding whether PGMA G300's minimum notification indication duration of 5 minutes after shutoff occurs, unless the generator is restarted, is sufficient;
- Information regarding the costs of the testing and certification requirements of the proposed rule;
- The appropriateness of the 180-day effective date. Comments recommending a longer effective date should describe the problems associated with meeting the proposed effective date and the justification for a longer one; and
- Information demonstrating whether it would be useful to add to the automatic shutoff warning either a visual representation of the risk presented, such as a skull and crossbones symbol, and/or the word "DANGER," "DANGEROUS," or "POISONOUS" before "CARBON MONOXIDE."

XVII. Notice of Opportunity for Oral Presentation

Section 9 of the CPSA requires the Commission to provide interested parties "an opportunity for oral presentation of data, views, or arguments." 15 U.S.C. 2058(d)(2). The Commission must keep a transcript of such oral presentations. *Id.* Any person interested in making an oral presentation must contact the Commission, as described under the **DATES** and **ADDRESSES** section of this notice.

XVIII. Promulgation of a Final Rule

Section 9(d)(1) of the CPSA requires the Commission to promulgate a final consumer product safety rule within 60 days of publishing a proposed rule. 15 U.S.C. 2058(d)(1). Otherwise, the Commission must withdraw the proposed rule if it determines that the rule is not reasonably necessary to eliminate or reduce an unreasonable risk of injury associated with the product or is not in the public interest. *Id.* However, the Commission can extend the 60-day period, for good cause shown, if it publishes the reasons for doing so in the *Federal Register*. *Id.*

The Commission finds that there is good cause to extend the 60-day period for this rulemaking. There have been substantial changes to the relevant voluntary standards, as well as extensive technical investigation requiring substantial time, since publication of the NPR in 2016. Regarding this SNPR and a final rule, under both the APA and the CPSA, the Commission must provide an opportunity for interested parties to submit written comments on a proposed rule. 5 U.S.C. 553; 15 U.S.C. 2058(d)(2). The Commission is providing 60 days for interested parties to submit written comments. Additionally, the CPSA requires the Commission to provide interested parties with an opportunity to make oral presentations of data, views, or arguments. 15 U.S.C. 2058. This requires time for the Commission to arrange a public meeting for this purpose and provide notice to interested parties in advance of that meeting, if any interested party requests the opportunity to present such comments. After receiving written and oral comments, CPSC staff must have time to review and evaluate those comments.

These factors make it impractical for the Commission to issue a final rule within 60 days of this proposed rule. Issuing a final rule within 60 days of this SNPR may limit commenters' ability to provide useful input on the rule, and CPSC's ability to evaluate and take that information into consideration in developing a final rule. Accordingly, the Commission finds that there is good cause to extend the 60-day period for promulgating the final rule.

List of Subjects in 16 CFR Part 1281

Administrative practice and procedure, Consumer protection, Incorporation by reference, Portable generators.

For the reasons discussed in this preamble, the Commission proposes to amend Title 16 of the Code of Federal Regulations by adding a new part to read as follows:

PART 1281—SAFETY STANDARD FOR PORTABLE GENERATORS

Sec.

1281.1 Scope, purpose, and effective date.

1281.2 Definitions.

1281.3 Requirements.

1281.4 Prohibited stockpiling.

1281.5 Findings.

1281.6 Standards Incorporated by Reference.

Authority: 15 U.S.C. 2056, 2058.

PART 1281—SAFETY STANDARD FOR PORTABLE GENERATORS

§ 1281.1 Scope, purpose, and effective date.

(a) This part 1281 establishes a consumer product safety standard for portable generators, as defined in § 1281.1(b), to address the acute carbon monoxide (CO) poisoning hazard associated with portable generators.

(b) For purposes of this rule, portable generators include single-phase, 300 V or lower, 60-hertz generators that are provided with receptacle outlets for alternating current (AC) output circuits and intended to be moved by the consumer, although not necessarily with wheels. The engines in these portable generators are small, nonroad spark-ignition engines, based on the EPA's engine classifications per 40 CFR 1054.801, and are fueled by gasoline, liquified propane gas, or natural gas. For purposes of this rule, portable generators do not include:

- (1) Permanent stationary generators;
- (2) 50-hertz generators;
- (3) Marine generators;
- (4) Generators solely intended to be pulled by, or mounted on vehicles;
- (5) Generators permanently mounted in recreational vehicles or motor homes;
- (6) Generators powered by compression-ignition engines fueled by diesel;
- (7) Industrial-type generators intended solely for connection to a temporary circuit

breaker panel at a jobsite, and not for consumer use.

(c) Any portable generator manufactured after [DATE 180 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER] shall comply with the requirements stated in §1281.3.

§ 1281.2 Definitions.

In addition to the definitions in section 3 of the Consumer Product Safety Act (15 U.S.C. 2051), the following definitions apply for purposes of this part 1281.

Air change rate, as defined in section 2 of PGMA G300-2018.

CO analyzer, as defined in section 2 of PGMA G300-2018.

CO shutoff system. Same as “portable generator system for controlling CO exposure.”

Engine, as defined in section 2 of PGMA G300-2018.

Maximum available observed wattage. Same as rated wattage.

Ordinary tools, as defined in section 2 of PGMA G300-2018.

Portable generator system for controlling CO exposure, as defined in section 2 of PGMA G300-2018.

Rated wattage. The output power rating of a portable generator as determined under section 6.3.2 of PGMA G300-2018.

Test room. A fully enclosed space with a volume of 895 - 2100 ft³ (25.34 – 59.47 m³) and a ceiling height of 8 - 12 ft (2.44 – 3.66m). The room dimensions shall allow for the requirements of the generator position to be met. The generator shall be positioned such that the exhaust jet centerline is along one of the room centerlines; the exhaust outlet on the generator is at least 6 ft (1.83m) from the opposite wall; the outer surfaces of the generator housing or frame is at least 3 ft (0.91m) from the walls to other sides; and the onboard CO sensor used for the CO safety shutoff system be at least 1 ft (0.30m) away from any obstruction. The room shall be constructed to control ventilation within a range of 0.1 – 1.0 air changes per hour (ACH). Ventilation shall be induced by a fan on the air outlet. The configuration of the air inlet and outlet for ventilation shall be designed such that neither port creates a flow directly onto or near

the CO analyzer sample port above the generator or the CO sensor onboard the generator that is used as part of the CO safety shutoff system. The CO sample port connected to the CO analyzer for determining the concentration of CO within the test room shall be placed 1 ft (0.30m) above the center point of the portable generator's top surface.

Units of measurement, as defined in section 2.1 of UL 2201.

§ 1281.3 Requirements.

(a) *CO Emission Rate Requirements.* The calculated weighted CO emission rate of the generator shall not exceed 150 g/h using one of two test methods, either the Portable Generator Assembly CO Emissions Method, as described in section 5.2 of UL 2201, or the Portable Generator Engine-Only CO Emissions Method, as described in section 5.3 of UL 2201.

(b) *CO shutoff construction requirements.* Comply with section 3.9.1 of PGMA G300, except replace all instances of “810 - 850 ppm” with “410 – 450 ppm”; “800 ppm” with “400 ppm”; “810 – 850 ppm” with “410 – 450 ppm”; “410 – 430 ppm” with “160 – 180 ppm”; and “400 ppm” with “150 ppm”. Replace each instance of “before” with “at or before”.

(c) *CO shutoff levels.* Comply with section 6.2.11.1 of PGMA G300, except replace 800 ppm with 400 ppm and 400 ppm with 150 ppm.

(d) *CO shutoff test method.* Comply with section 6.2.11.2 of PGMA G300. The definition of “test room” in § 1281.2 shall apply for purposes of the CO shutoff test method.

(e) *Self-monitoring system.* Comply with section 3.9.1.1 of PGMA G300-2018.

(f) *Tamper resistance.* (1) A portable generator system for controlling CO exposure shall be tamper resistant. The system is considered tamper resistant when any part that is shorted, disconnected, or removed to disable the operation of the system prevents the engine from running. In addition, all parts, including wiring, which affect proper operation of the portable generator system for controlling CO exposure, must be (a) permanently sealed or (b) not normally accessible by hand or with ordinary tools. It is permissible for different parts of the

portable generator system for controlling CO exposure to meet either option (a) or (b), provided all of the different parts meet at least one of these two options.

(2) Comply with section 3.9.1.2.2 – 3.9.1.2.4 of PGMA G300-2018.

(g) *Notification.* (1) Comply with 3.9.1.3 of PGMA G300-2018.

(2) The portable generator system for controlling CO exposure shall include a prominent and conspicuous notification of shutoff event or system fault event in a readily visible location to a consumer who is positioned in front of the start-up controls.

(3) *CO Shutoff Event Notification.* The portable generator system for controlling CO exposure shall provide a notification after a CO shutoff event. The notification shall be a red indication. The red indication shall be at least 0.4 inches (10mm) in diameter, illuminated and, if flashing, must flash at a rate of between 3 and 10 Hertz (Hz), with equivalent light and dark duration. The notification shall remain for a minimum of 5 minutes after a shutoff occurs unless the portable generator engine is restarted. If the portable generator engine is restarted, the notification shall not be present.

(4) *System Fault Event Notification.* Comply with 3.9.1.3.2 of PGMA G300-2018.

(h) *Carbon Monoxide Sensor.* Comply with section 3.9.1.4 of PGMA G300-2018.

(i) *Shut-Down Safety.* Comply with section 4.1.1.1.3 of PGMA G300-2018.

(j) *Marketing, labeling and instructional requirements.* (1) Comply with section 7.2.1, 7.2.2.1, 7.2.2.2, 7.2.2.3, and 7.2.2.5 of PGMA G300-2018.

(2) Comply with section 7.2.2. 4 of PGMA G300-2018, with the following changes:

(i) When referring to the placement of the label shown in Figure 5 of PGMA G300-2018, replace “shall be in close proximity to” the notification with “shall be no more than 0.25 inches (6.35 mm) from” the notification.

(ii) Revise the label shown in Figure 5 of PGMA G300-2018 as follows: replace the phrase, “YOU MUST:” with “HIGH LEVELS OF CARBON MONOXIDE.”; replace the language in the second panel with the following: “BEFORE RESTARTING, move generator to a

more open, outdoor area. Point exhaust away. See DANGER label and product manual for more information.”; in the bottom panel, change replace the phrase “IF SICK” with “if you feel sick.”; specify that the text in all but the top panel must be formatted using sentence capitalization, except for the following words and phrases: “BEFORE RESTARTING,” “DANGER,” and “MOVE TO FRESH AIR AND GET MEDICAL HELP.” The text in the top panel, or header, must have letter heights of at least 0.12 inches, and all other text in the label must have text whose uppercase letters measure at least 0.1 inches in height.

(3) Comply with section 8 of PGMA G300-2018.

§ 1281.4 Prohibited stockpiling.

(a) *Prohibited acts.* Manufacturers and importers of portable generators shall not manufacture or import portable generators that do not comply with the requirements of this part in any 1-month period between [DATE OF PUBLICATION OF FINAL RULE] and [EFFECTIVE DATE OF FINAL RULE] at a rate that is greater than 105 percent of the rate at which they manufactured or imported portable generators during the base period for the manufacturer or importer.

(b) *Base period.* The base period for portable generators is the calendar month with the median manufacturing or import volume within the last 13 months immediately preceding the month of promulgation of the final rule.

§ 1281.5 Findings.

(a) *General.* The CPSA requires the Commission to make certain findings when issuing a consumer product safety standard. 15 U.S.C. 2058(f). This section discusses support for those findings.

(b) *Degree and Nature of the Risk of Injury.* As of May 10, 2022, there were at least 1,332 deaths involving portable generators from 2004 through 2021, or an average of about 74 annually. Because death certificate data often have a lag time of around two to three years from the date of reporting to CPSC, the actual number of incidents for 2020 and, 2021 is likely higher.

From 2004 through 2021, there were a total of 17,569 nonfatal CO poisonings involving portable generators that were treated in hospital emergency departments (about 976 annually); 7,308 hospital admissions (an average of 406 per year); and 52,782 medically attended injuries treated in other settings (an estimated 2,932 per year).

(c) Number of Consumer Products Subject to the Rule. In 2021, there were approximately 1,355 individual models for sale in the U.S. There were an estimated 2.1 million units sold in 2021.

(d) Need of the Public for the Products and Probable Effect on Utility, Cost, and Availability of the Product. (1) The portable generators within the scope of this proposed rule are commonly purchased by household consumers, particularly to provide electrical power during emergencies (such as power outages caused by storms); when power to the home has been shut off or it is needed at locations around or away from the home that lack access; and for recreational activities such as camping. Built-in wheels or optional wheel kits are often available for heavier, more powerful units (*e.g.*, those with 3 kW power ratings or more).

(2) The proposed rule's emission requirement may improve portable generator's fuel efficiency, as well as other characteristics such as ease of starting, altitude compensation, fuel adaptability, power output, reliability, and engine life; features that would likely increase the utility of the generator to the consumer in a meaningful way. In addition to this, safer portable generators from the implementation of the emissions and sensor/shutoff requirements would mitigate the anxiety of operating a hazardous product, and hence improve consumer utility as well. Conversely, consumer utility may decrease as a result of potential consumer behavioral adaption to a safer product that could lessen the attention paid to CO safety.

(3) The proposed rule would increase the undiscounted cost of redesigning, testing, and manufacturing portable generators by an average of \$53.38. About three fifths of the cost increase would be transferred to consumers through price increases. The cost increase represents slightly more than 5 percent of the average price of a portable generator, of which more than 3

percent would be transferred to consumers. This transfer would increase the average price per portable generator from about \$1,000 to \$1,034. The quantity of portable generators demanded by consumers would decrease as a result of this price increase by less than 2 percent.

Nevertheless, except for potential shortages associated with the inability of manufacturers to comply with the requirements of the rule prior to the effective date, it is unlikely that the rule has any significant impact on the availability of the product to consumers. The potential transitional shortages would likely last only for a brief period of time, and would be alleviated as manufacturers become increasingly compliant with the proposed rule.

(e) Any Means to Achieve the Objective of the Proposed Rule, While Minimizing Adverse Effects on Competition and Manufacturing. (1) The rule achieves the objective of addressing acute CO poisoning hazards from portable generators while minimizing the effect on competition and manufacturing. The rule is largely based on requirements in two existing voluntary standards, and manufacturers are generally aware of the requirements. At least one manufacturer already complies with the main requirements of the rule, and has done so cost-effectively. The rule would apply to all manufacturers and importers of portable generators, so its economic impacts should not be highly burdensome for any particular manufacturer or importer. Additionally, manufacturers can transfer some, or all, of the increased production cost to consumers through price increases. Finally, the regulatory flexibility analysis concluded that only one small business is likely to be significantly impacted by the implementation of the rule. (2) The Commission considered alternatives to the rule to minimize impacts on competition and manufacturing including: (1) implementing the proposed rule without the emission requirements and shutoff requirement levels from UL 2201; (2) relying on the voluntary adoption of the proposed rule requirements into UL 2201 or PGMA G300; (3) issuing a rule that relies on either UL 2201 or PGMA G300 as currently written; (4) not issuing a rule and continue to conduct information and education campaigns; and (5) taking no action. The Commission determines that none of these alternatives would adequately reduce the risk of deaths and injuries associated

with the acute CO poisoning hazard associated with portable generators that the rule addresses. The rule is expected to generate more net societal benefits (benefits minus costs) than any of these alternatives.

(f) *Unreasonable Risk.* (1) Based on the data from the reports that were entered in CPSC's databases as of May 10, 2022, there have been at least 1,332 deaths for years 2004 through 2021.

(2) Based on data from the National Electronic Injury Surveillance System, for the 18-year period from 2004 through 2021 there were at least 17,569 CO injuries associated with portable generators that were treated in emergency departments (ED) in which the patient was subsequently released without being admitted, and 5,727 injuries that required hospitalization after the ED.

(3) Based on data from CPSC's Injury Cost Model (ICM), for the years 2004 through 2021, there were an estimated 1,580 injuries that resulted in direct hospital admissions and 52,782 injuries resulted in a doctor's or clinic's visit. Combined with the NEISS estimates, there were an estimated 77,658 nonfatal injuries that were treated in the same 18-year period.

(4) Data from the Centers for Disease Control and Prevention (CDC) provide a source of comparison of the relative risk of CO poisoning associated with portable generators. CDC estimates that at least 430 people die in the United States from accidental CO poisoning every year. These are deaths caused by CO from any source, including motor vehicles. The average number of generator-related consumer CO deaths per year in CPSC's databases for the three most recent years of complete data, years 2017 through 2019, is 85, which is nearly 20 percent of CDC's estimate.

(5) The Commission estimates that the rule would result in aggregate net benefits of about \$897.06 million annually, discounted at 3 percent. The Commission estimates that the net benefits on a per-unit basis, when discounted at 3 percent, are \$233.99. These net benefits per product represent roughly 23 percent of the average price of a portable generator, whereas total

unit costs discounted at 3 percent are less than 4 percent of the average price. The Commission concludes that portable generators pose an unreasonable risk of injury and finds that the rule, including its effective date, are reasonably necessary to reduce the unreasonable risk of injury.

(g) *Public Interest.* The rule addresses an unreasonable risk of acute CO poisoning associated with portable generators. Adherence to the requirements of the proposed rule would reduce deaths and injuries from portable generator acute CO poisoning; thus, the rule is in the public interest.

(h) *Voluntary Standards.* (1) Under section 9(f)(3)(D) of the CPSA, if a voluntary standard addressing the risk of injury has been adopted and implemented, then, in order to proceed with rulemaking, the Commission must find either that: the voluntary standard is not likely to eliminate or adequately reduce the risk of injury, or substantial compliance with the voluntary standard is unlikely.

(2) There are two voluntary standards that address the risk of acute CO poisoning from portable generators: UL 2201, *Standard for Safety for Carbon Monoxide (CO) Emission Rate of Portable Generators, Second Edition* (“UL 2201”) and ANSI/PGMA G300-2018 (Errata Update), *Safety and Performance of Portable Generators* (“PGMA G300”).

(3) Based on information provided by manufacturers and in market research materials, the Commission estimates a 30 percent compliance rate with PGMA G300’s sensor and shutoff requirements. One sixth of those PGMA-compliant units (or 5 percent of the total) are estimated to also be compliant with the emissions requirements of UL 2201. In addition, the CO hazard mitigation requirements have been included in both standards since 2018, approximately 5 years ago, yet the number of fatalities since then have not only not abated but appear to be increasing. The Commission concludes that compliance in the marketplace with either voluntary standard is not substantial, and substantial compliance is unlikely in the future.

(4) The Commission finds that the CO emission rate requirements and CO shutoff levels from UL 2201 are extremely effective in reducing deaths and injuries associated with acute CO

poisoning from portable generators in simulations. The Commission concludes that these requirements are not adequate without additional requirements that ensure the durability, reliability and functionality of the CO shutoff system, and requirements pertaining to CO shutoff notification and labeling. Therefore, the rule incorporates PGMA G300's CO shutoff test method, and requirements from PGMA G300 specifying aspects of the shutoff system's construction, ability to self-monitor, and tamper resistance, and labeling, with modifications that are necessary to ensure the effectiveness of these requirements.

(i) *Reasonable Relationship of Benefits to Costs.* (1) The rule would impose the following quantifiable costs: (a) increased variable costs of producing portable generators with reduced CO emission rates and CO sensors with shutoff capabilities; (b) one-time conversion costs of redesigning existing portable generator models, modifying manufacturing operations, and the recurrent testing costs to validate compliance of each new model with the proposed standard; (c) sensor replacement costs to consumers for failed CO sensors or sensors that have reached end of life; and (d) deadweight loss caused by price increases resulting from increased manufacturing costs. The Commission performed a 30-year prospective cost assessment (2024-2053) of these four cost categories and estimated the total annualized cost from the proposed rule to be \$148.94 million, discounted at 3 percent. The Commission estimated the costs per portable generator to be \$38.85, discounted at 3 percent.

(2) The Commission also conducted a benefits assessment of the rule. The benefits assessment accounted for the prevention of deaths and injuries from introducing compliant portable generators, which the Commission monetized using the value of statistical life for deaths and estimates of the cost per type of injury from the CPSC's Injury Cost Model. Over the 30-year study period, the Commission estimated the rule would prevent 2,148 deaths (nearly 72 deaths per year) and 126,377 injuries (roughly 4,213 injuries per year). The total annualized benefits from the rule are \$1,046 million, discounted at 3 percent. The Commission estimates the per-unit benefits from the rule to be \$272.84, discounted at 3 percent.

(3) The estimated benefits of the rule far exceed its estimated costs. The Commission calculates net benefits (benefits less costs) to be \$897.06 million on an annualized basis, discounted at 3 percent.⁴¹ The net benefits on per-unit basis are \$233.99, discounted at 3 percent. Overall, the rule has a benefit-cost ratio of 7.02; that is, for every \$1 in direct cost to consumers and manufacturers, the proposed rule generates \$7.02 in benefits from mitigated deaths and injuries.

(j) Least-Burdensome Requirement that Would Adequately Reduce the Risk of Injury.

The Commission considered five alternatives to the rule including: (1) implementing the rule without the emission requirements and shutoff requirement levels from UL 2201; (2) relying on voluntary adoption of the rule requirements into UL 2201 or PGMA G300; (3) issuing a rule that relies on either UL 2201 or PGMA G300 as currently written; (4) not issuing a rule and continue to conduct information and education campaigns; and (5) taking no action. Although most of these alternatives may be a less burdensome alternative to the rule, the Commission determines that none of the less burdensome alternatives would adequately reduce the risk of deaths and injuries associated with portable generators that is addressed in the rule.

§ 1281.6 Standards Incorporated by Reference.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. This material is available for inspection at the U.S. Consumer Product Safety Commission and at the National Archives and Records Administration (NARA). Contact the U.S. Consumer Product Safety Commission at: Office of the Secretary, U.S. Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD 20814, telephone (301) 504-7479, e-mail cpsc-os@cpsc.gov, and is available from the sources listed below. For information on the availability of this material at NARA, email fr.inspection@nara.gov, or go to: www.archives.gov/federal-register/cfr/ibr-locations.html.

⁴¹ Over the 30-year period, net benefits reach \$17.58 billion, discounted at 3 percent.

(b) Portable Generator Manufacturers' Association, 1300 Summer Avenue, Cleveland, OH 44115-2851; phone: 216.241.7333; e-mail: pgma@pgmaonline.com; www.pgmaonline.com. ANSI/PGMA G300-2018 (Errata Update) *Safety and Performance of Portable Generators*, approved [DATE]; IBR approved for [SECTIONS]. A read-only copy is available at [www.pgmaonline.com/pdf/ANSI_PGMA G300-2018\(ErrataUpdateApril2020\).pdf](http://www.pgmaonline.com/pdf/ANSI_PGMA G300-2018(ErrataUpdateApril2020).pdf).

(c) Underwriters Laboratories, 1850 M St. NW STE 1000, Washington, DC 20036; 202.296.7840; www.ul.com. UL 2201, 2nd Edition, *Standard for Carbon Monoxide (CO) Emission Rate of Portable Generators*, approved January 24, 2018; IBR approved for [SECTIONS]. A read-only copy is available at www.shopulstandards.com/ProductDetail.aspx?UniqueKey=33821, or it can be purchased at www.shopulstandards.com.

Alberta E. Mills,

Secretary, Consumer Product Safety Commission.

[FR Doc. 2023-07870 Filed: 4/19/2023 8:45 am; Publication Date: 4/20/2023]